

2020 OPERATIONS PERFORMANCE



Freeway Operations and Special Facilities Performance

Contents

Division Administrator’s Letter	ii
Overview	iii
Statewide	1
Bristol District.....	12
Salem District	19
Richmond District.....	26
Hampton Roads District	33
Fredericksburg District.....	39
Culpeper District	46
Staunton District	53
Northern Virginia District.....	60

AUTHORS / REVIEWERS

Katie McCann, Operations Division
Paul Szatkowski, Operations Division

CONTENT CONTRIBUTORS

Joshua Byrd, Operations Division
Susan Gayton, Operations Division
George Gardner, Operations Division

Division Administrator's Letter

New Beginnings

As 2020 progressed, we became accustomed to frequent changes in our professional and personal lives. The uncertainty of the COVID-19 pandemic's length and its impacts required us to be flexible and adaptive to change. Many of us are now working in new environments, using new tools, and modifying our work to provide the services that promote safe and reliable travel.

There are many examples of change. We successfully operated all of our Traffic Operations Centers when COVID cases occurred among our staff. The Central Region opened a new Traffic Operations Center and now enjoys the benefits of co-locating VDOT Traffic Operations staff with the Virginia State Police. Our Active Traffic Management System continues to evolve for us to have a common system across the Commonwealth. The Interstate Operations Corridor studies are advancing. New cameras and safety service patrols are available on I-81. Variable speed limit systems and dynamic ramp metering programs are being developed for I-95. Planning studies for the remaining interstate corridors are nearly complete.

Before COVID-19 impacted traffic volumes, we saw improvements in mobility and incident duration metrics on I-81 that came from the improvements put into place from the corridor study. Our aggressive planning and implementation efforts won VDOT an award from the Southeastern Association of State Highway and Transportation Officials for Operations Excellence. COVID-19 has since impacted our performance. While the traffic volumes dropped during the pandemic, the traffic mix also changed. We now experience a higher percentage of commercial vehicle traffic. This change requires us to address traffic management and incident management differently.

I am pleased to introduce the new Operations Performance report. This report shows additional metrics regarding incident management. New metrics are shown for operations asset management, operations program coverage areas, and weather events. These new metrics will enable our teams to assess our successes and resources so we can continue to be adaptive to the changing needs.

Ali Farhangi

VDOT Operations Division Administrator

Overview

Operations performance is trending in a positive direction. However, COVID-19 had a significant effect on 2020. Volumes were down by as much as 60% in April 2020. While the decrease in volume had a positive impact on congestion (down 55%), the effects on traffic incident management were not as positive. COVID-19 impacted both the traffic volume and traffic mix. In many areas, there were a greater percentage of commercial vehicles as regular commuters began working from home. Commercial vehicles incident can take longer to clear than automobile incidents. For this reason, the Median Roadway Clearance time was up six minutes statewide and seven minutes in Northern Virginia District.

2020 coincided with the implementation of several new operations improvements on the I-81 corridor. SSP coverage expanded and now covers all of I-81 between MP 96 and the West Virginia State Line. New cameras were installed to provide greater awareness for the Traffic Operation Centers. The 12 month before & after comparison showed great improvement in traffic incident management. Average response time for SSP vehicles to get to the scene of an incident decreased from 16 minutes to 12 minutes and the percent of incidents with an SSP response increased to 94%.

In addition to I-81, projects proposed in the I-95 corridor will be underway soon. The I-64, I-77, I-295, and I-85 corridor studies are wrapping up with plans to expand camera coverage and towing programs, improve technology in the mountain tunnels, and install new message signs.

VDOT now includes metrics for each cause of congestion used in the standard congestion pie diagram.

Two new performance measures were established for incident management in 2020:

- Percent of Lane Impacting Incidents Cleared < 30 minutes
- Percent of Lane Impacting Incidents Cleared < 90 minutes

These new measures were selected to allow the districts and regions to focus on the 30 minutes and 90 minute milestones for incidents clearance. The 30 minute measure focuses on events such as disabled vehicles and simple crashes while the 90 minutes measure is focused on more complex crashes especially those involving tractor trailers. District specific targets for both measures were set using a data-driven approach and introduced at the end of 2020.

This report also includes new metrics such as the potential number of secondary crashes, availability and numbers of ITS assets, lane impacting work zones, and special facilities performance. VDOT will continue to develop future metrics to enable the operation program to assess the impact of key programs and strategies to improve mobility.

Statewide

Summary Interstate Highway Performance for 2020

Measure	Vehicle Hours of Delay on Interstates							Lynchburg
	Bristol	Salem	Richmond	Hampton Roads	Frederick..	Culpeper	Staunton	
Vehicle Hours of Delay on Interstates	120K	329K	571K	1,554K	1,383K	47K	333K	3,269K
	No Interstates in Lynchburg							
ALL INCIDENTS	All Roads							No Interstates in Lynchburg
	All Reported Incidents	2,877	7,553	24,385	7,170	4,360	10,910	24,310
ALL INCIDENTS	Interstate							
	All Reported Incidents	2,104	5,837	21,141	5,605	3,099	9,413	22,377
ALL INCIDENTS	Scene Clearance Time (minutes)	18	16	16	Data Not Available			22
	Potential Secondary Crash Incidents	46	78	647	292	117	20	112
ALL INCIDENTS	All Roads							473
	Lane Impacting Incidents	627	1,411	4,372	6,286	1,598	1,360	2,161
LANE IMPACTING INCIDENTS	Interstate							
	Lane Impacting Incidents	400	745	3,278	5,326	727	342	1,035
LANE IMPACTING INCIDENTS	Roadway Clearance Time (minutes)	42	52	42	22	44	40	48
	Lane Impacting Incidents Cleared in < 30 minutes	35%	26%	39%	58%	35%	37%	30%
LANE IMPACTING INCIDENTS	No Interstates in Lynchburg							89%
	Lane Impacting Incidents Cleared in < 90 minutes	82%	78%	88%	93%	85%	92%	81%

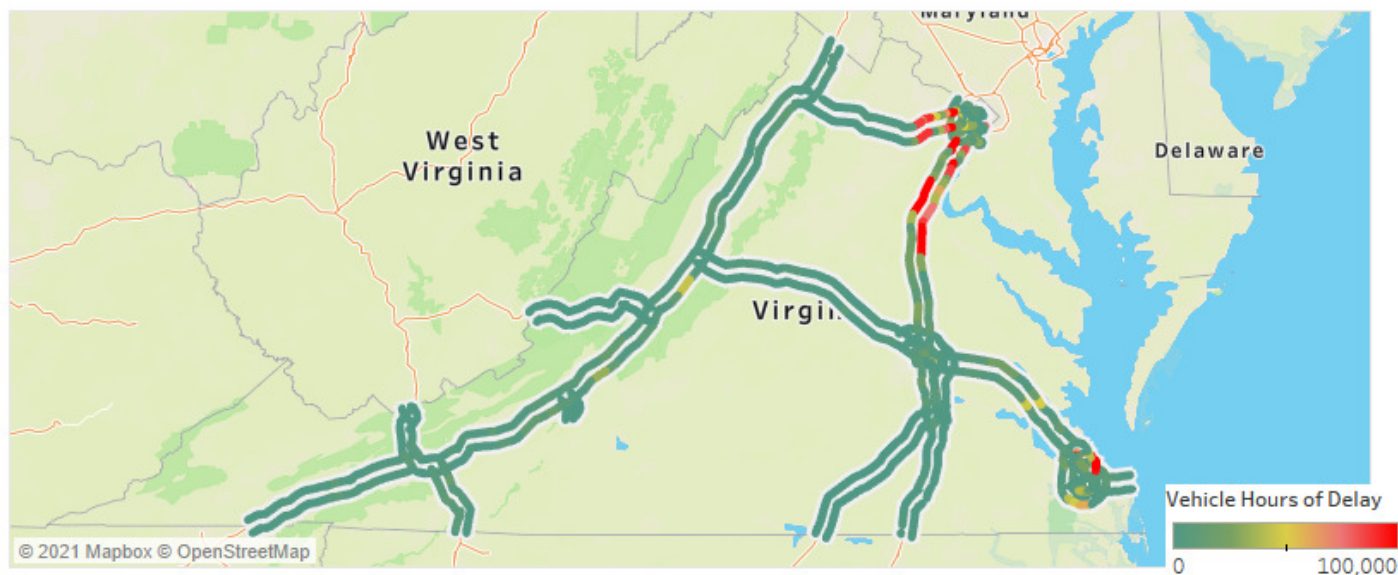
* At this time, data for all incidents is not available for Hampton Roads District. This will be resolved when Eastern Region Operations is tied into the Statewide ATMS.

Statewide Summary

This report compares performance of Interstate Highways from 2019 to 2020

Measure			Target	2019	2020
Total Vehicle Hours of Delay on Interstates The additional hours travelers waited in traffic that is moving 20 mph less than free-flow speed			↘	17,225K	7,606K
ALL INCIDENTS	All Roads	All Reported Incidents Number of disabled vehicle and crash incidents	N/A	108,056	91,716
	Interstates	All Reported Incidents Number of disabled vehicle and crash incidents	N/A	90,779	76,643
		Scene Clearance Time Median time from verifying the incident to opening all lanes and shoulders	↘	22	21
		Potential Secondary Crash Incidents Estimated # of crash incidents which could be secondary to other incidents	↘	2,919	1,900
LANE IMPACTING INCIDENTS	All Roads	Lane Impacting Incidents # of disabled vehicle and crash incidents that block at least one travel lane	N/A	26,573	23,664
	Interstates	Lane Impacting Incidents # of disabled vehicle and crash incidents that block at least one travel lane	N/A	18,138	16,134
		Roadway Clearance Time Median time from verifying the incident to opening all travel lanes to traffic	↘	31	37
		Lane Impacting Incidents Cleared in < 30 minutes Percentage of Lane Impacting Incidents that are cleared in less than 30 min	N/A	49%	43%
		Lane Impacting Incidents Cleared in < 90 minutes Percentage of Lane Impacting Incidents that are cleared in less than 90 min	N/A	91%	89%

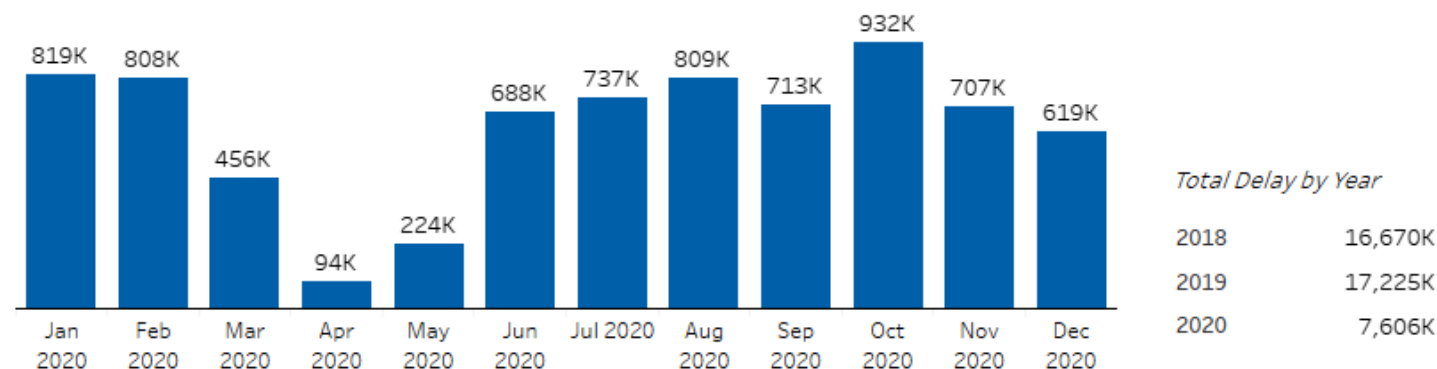
Congestion in 2020



Congestion Overview

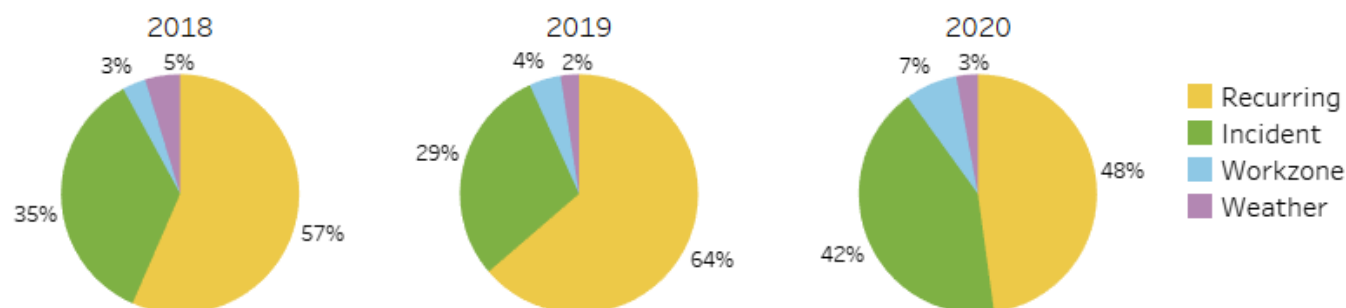
Vehicle Hours of Delay

Total Delay is calculated using INRIX probe speed data and historical VDOT volumes. Delay is calculated when the observed speed is 20 mph or more below free flow conditions.

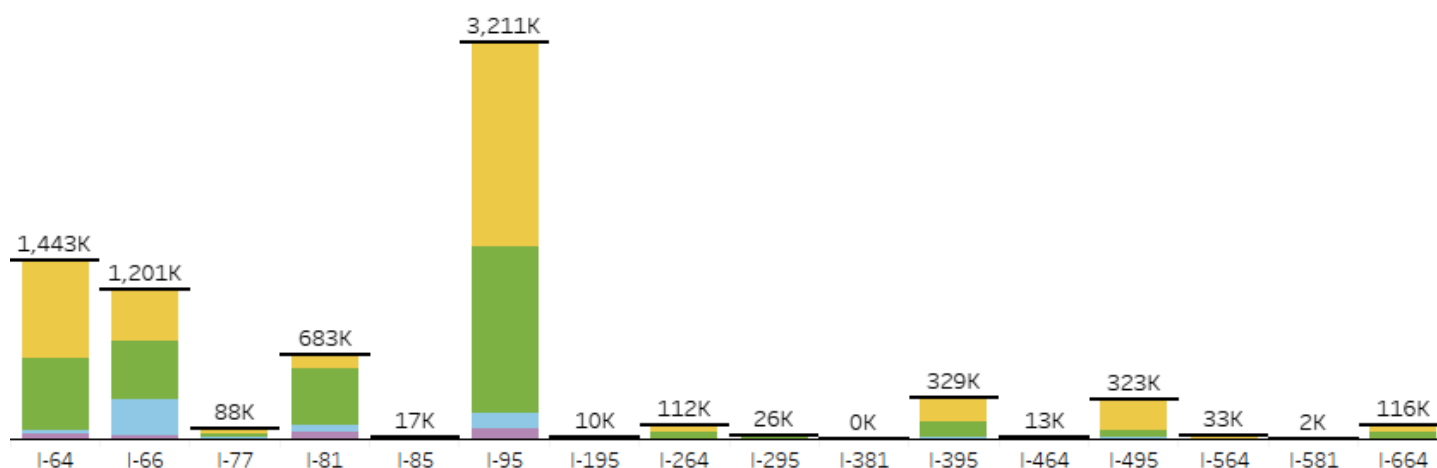


Causes of Congestion

Congestion can be broken down into recurring and non-recurring sources. Recurring congestion is caused by bottlenecks due to high volume or geometric constraints. Sources of non-recurring congestion on interstates include incidents, work zones, and weather events. The amount of congestion due to each of these sources can be estimated at a planning level as shown below.



Delay by Cause & Interstate in 2020



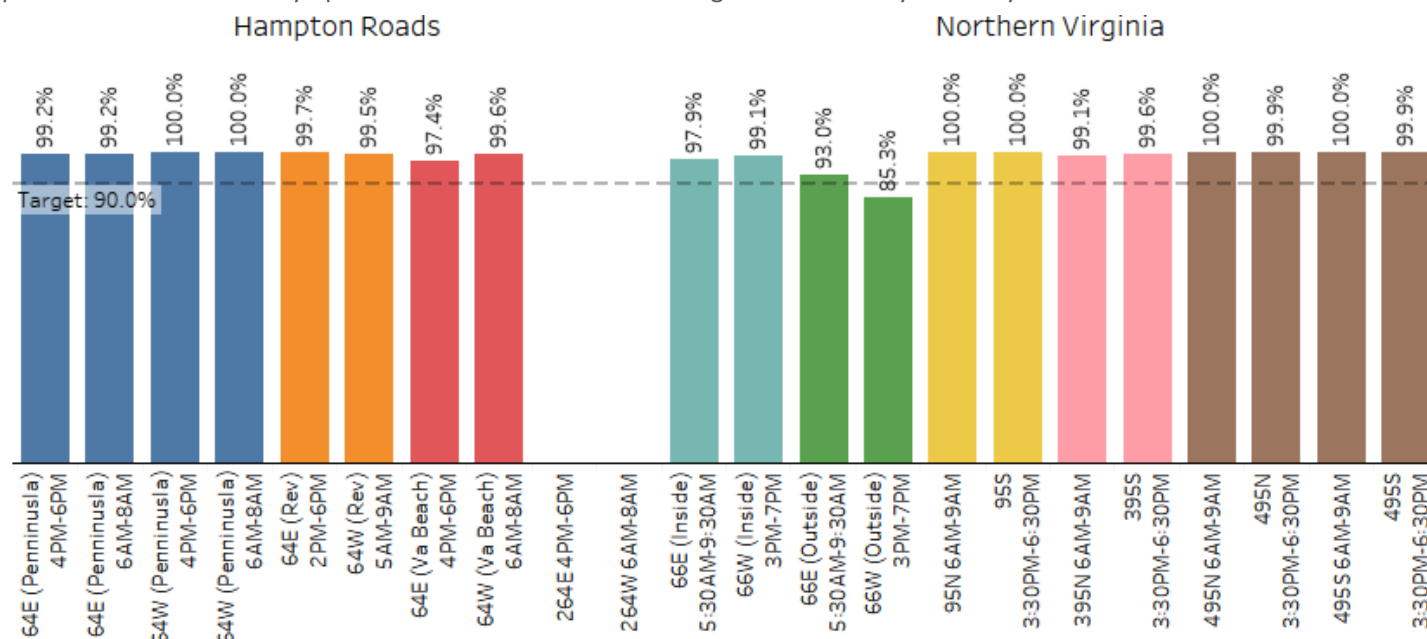


Recurring Congestion

Recurring Congestion occurs when there are capacity issues most often during peak travel hours. Recurring congestion is difficult to manage. However, VDOT can adjust roadway capacity by using managed lanes like HOV or hard shoulders. VDOT measures managed lane performance to adjust these programs.

HOV Degradation

HOV facilities encourage carpooling in an effort to reduce congestion in urban areas. HOV performance is monitored by the percent of time the facility operates at or above 45 MPH during the non-holiday weekdays of 2020.



Data was not available for I-264; however review of the general purpose lanes found no degradation so it is assumed that HOV lanes were flowing above 45 MPH as well.

Managed Lanes

Summary as of December 31, 2020. Facilities > 3 miles considered.

Facility Type	Facilities	Centerline Miles (2020)
High Occupancy Vehicle Lanes	I-66 Exit 40 to Exit 64	22
	I-264 Exit 10 to Exit 18	8
	I-64 Exit 255 to Exit 264	10
	I-64 Exit 285 to Exit 290	6
	VA 267 Dulles Toll Road	10
High Occupancy Toll Lanes	I-495 Express Lanes	14
	I-95 Reversible Express Lanes	29
	I-395 Reversible Express Lanes	9
	I-64 Reversible Express Lanes	7.5
	I-66 Inside the Beltway	10
Part Time/Dynamic Hard-Shoulder Usage	I-66	6.5
	I-264	3.5

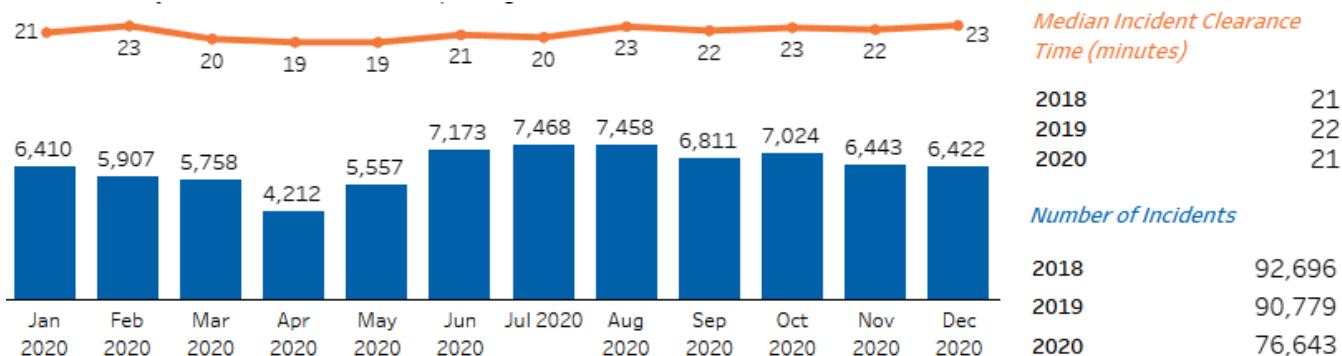


Incidents

Traffic incidents includes both crashes and disabled vehicles and are a frequent cause of non-recurring congestion. Quick clearance programs such as Safety Service Patrols, incident management coordination, and after-action review with the Virginia State Police (VSP) and the other first responders can influence the effects of incidents on traffic.

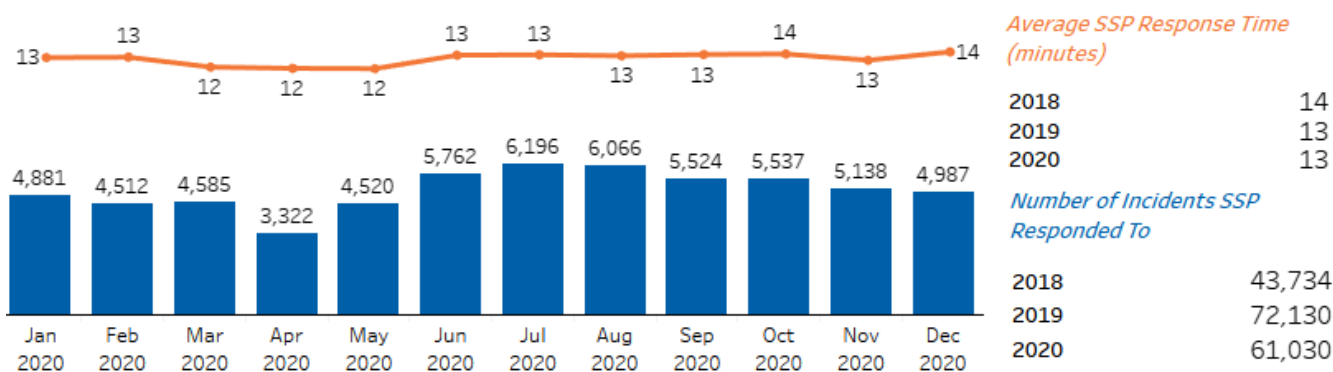
Total Incidents & Incident Clearance Time

Incident Clearance Time (also called Scene Clearance Time) is measures for all crash and disabled vehicle incidents on travel lanes and shoulders. Median Incident Clearance Time is shorter than Median Roadway Clearance Time because it is measures for all incidents, not just those which are lane impacting. A simple incident on a shoulder, such as a vehicle with a flat tire, is often quick to clear.

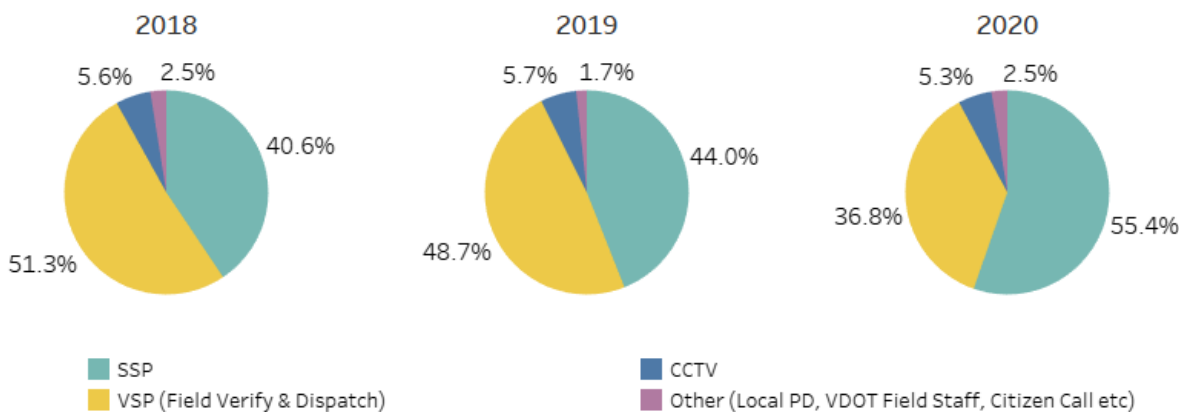


Safety Service Patrol Incident Responses & Response Time

Safety Service Patrol (SSP) Response Time is measured in minutes from the time the SSP Operator was notified to the time they arrived on Scene. This is measured for all disabled vehicle and crash incidents, which an SSP responded to. (Average Response Time between 2 and 60 minutes is measured)

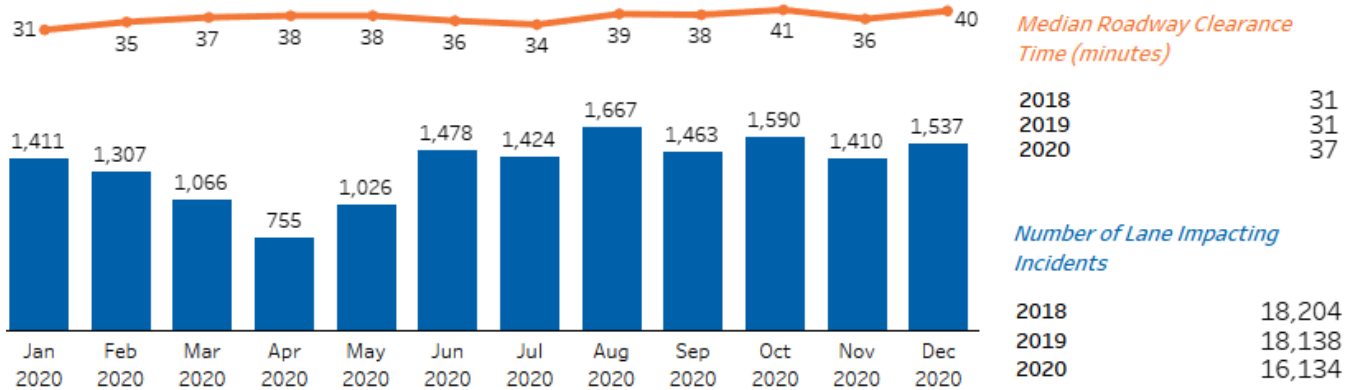


All Incidents by Detection Source

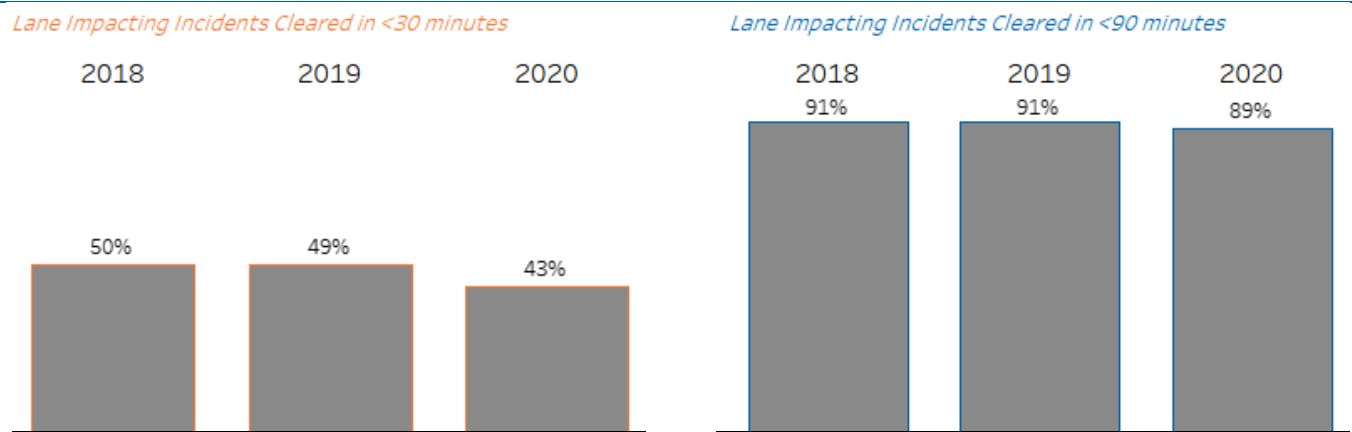


Lane Impacting Incidents & Roadway Clearance Time

Roadway Clearance Time (RCT) is measured for all disabled vehicle and crash incidents that block at least one travel lane during the course of the incident. RCT is measured from the start of the incident to when all travel lanes are clear and open to traffic.

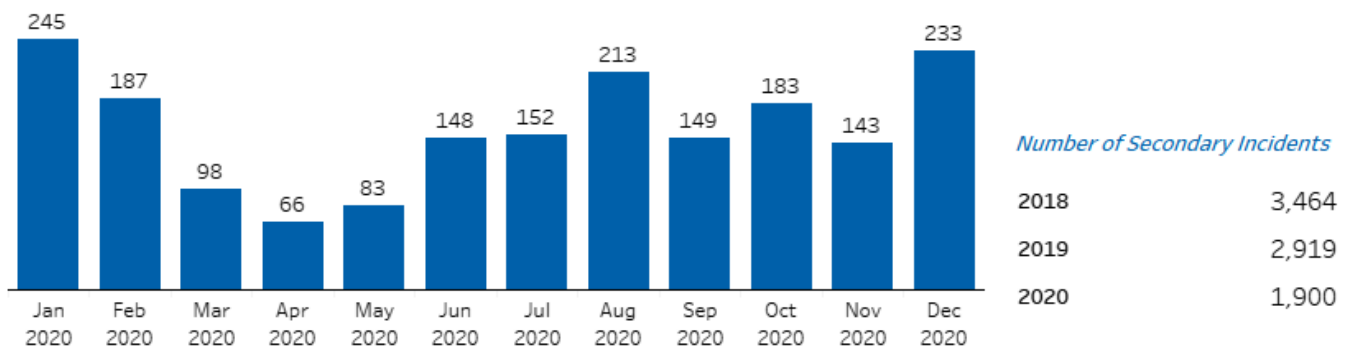


Lane Impacting Incidents by Roadway Clearance Time



Potential Secondary Incidents

The estimated number of crash incidents which could be secondary to other crash or disable vehicle incidents.





Work Zones

VDOT measures the number and types of work events and the impact on non-recurring congestion. The allowable work hours are regularly reviewed to promote safety and reduce congestion.

Work Zones by District

Work zone event data from VaTraffic

	Number of Lane Impacting Work Zones		Mile - Hours of Lane Impacting Work Zones	
	2019	2020	2019	2020
Bristol	496	832	13,218	19,912
Salem	648	1,221	10,272	24,958
Richmond	2,759	3,219	68,215	74,647
Hampton Roads	1,382	1,249	51,525	23,041
Fredericksburg	416	571	6,606	12,922
Culpeper	171	237	4,125	9,499
Staunton	1,317	1,013	43,556	39,544
Northern Virginia	5,609	5,521	85,856	80,102
Grand Total	12,798	13,863	283,374	284,624

Work event types include: new roadway construction; road widening; resurfacing; paving; bridge replacement; bridge joint, approach, deck, and superstructure repairs; bridge inspections; pavement marking installation; ITS equipment repair and installation; tunnel cleaning; and overhead sign structure repairs. Long-term work zones (>7 days) were not included.



Weather

VDOT measures the number and types of weather events and the impact on non-recurring congestion. The data helps identify emerging maintenance trends.

Short Term Weather Events

Number of weather events/incidents

Type	2019	2020
Fog	517	849
High Wind	224	433
Icy Conditions	21	25
Standing Water (Ponding)	73	78
Other	173	230

Long Term Weather Events (Road Condition)

Mile-Hours of Interstate reported in condition other than "open"

Weather Event	Road Condition	2019	2020
Flood	Closed	50	
Snow/Ice	Minor	65,973	21,088
	Moderate	14,841	10,997
	Severe		73
	Closed	0	0



Operations Assets

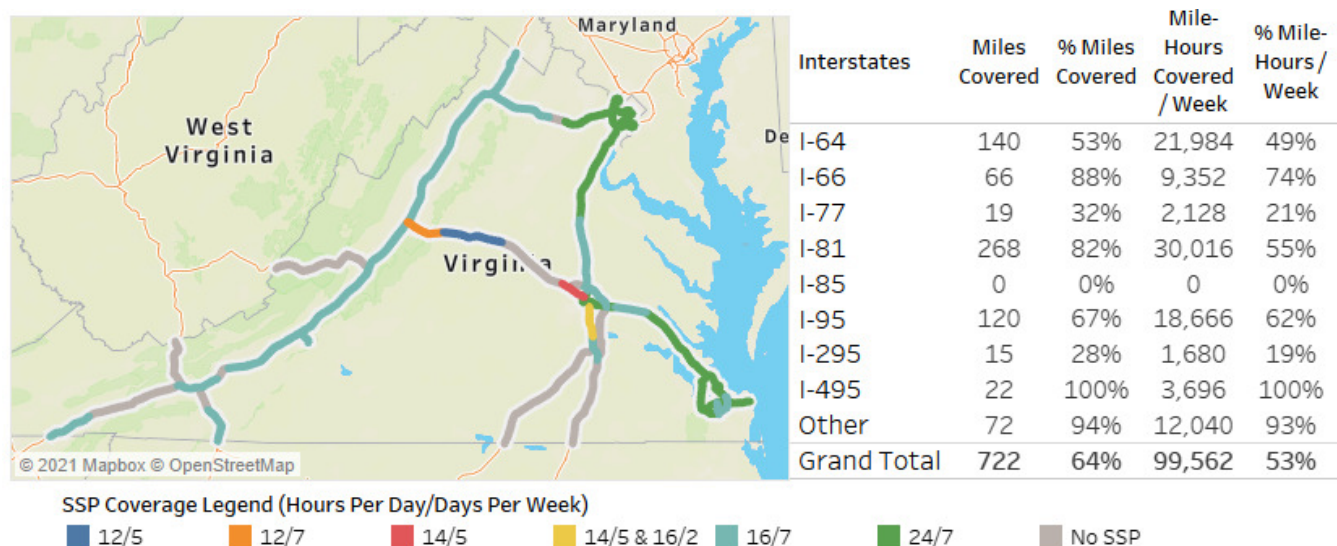
Cameras, Signs, and Safety Service Patrols are among the tools used to manage and minimize traffic congestion due to both recurring and non-recurring causes. VDOT measures the coverage areas and condition of these assets that help monitor traffic and improve mobility.

ITS Assets Availability

Device Type	Number of Devices	% of Time Devices were Online
CCTV	1,024	94.7%
CCTV Portable	59	98.2%
CMS	464	96.1%
CMS Portable	104	86.9%

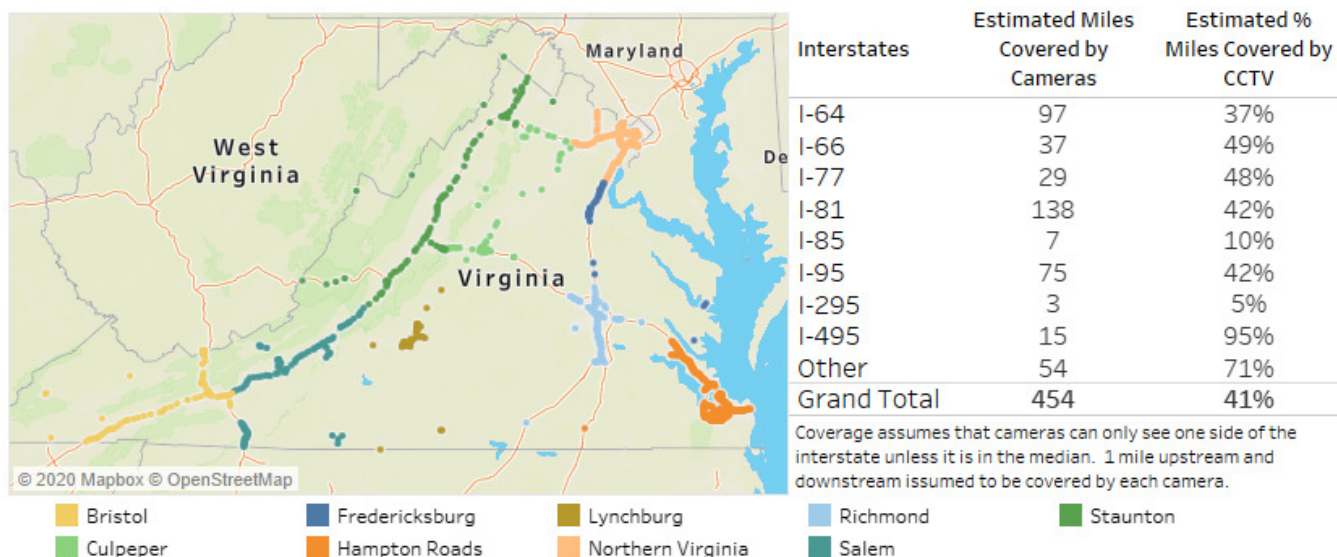
Safety Service Patrol Coverage

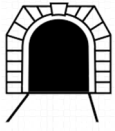
Coverage as of December 31, 2020



Camera Coverage

Cameras (CCTV) as of December 31, 2020





Special Facilities Operations

VDOT owns and operates tunnels, movable bridges, and auto-ferry systems across the state. Incidents which result in closures at any of these facilities can create significant bottlenecks as they provides limited transportation services at a unique geographic feature.

Tunnels

VaTraffic incidents and work zones for 2020

Facility	Type	Hours of Unplanned Lane Impacting Activities*	Hours of Planned Lane Impacting Activities**
I-64 Hampton Roads Bridge Tunnel	Underwater	548	1131
I-664 Monitor Merrimac Memorial Bridge Tunnel	Underwater	252	379
I-264 Downtown Tunnel	Underwater	11	553
US 58 Midtown Tunnel	Underwater	8	661
I-77 Big Walker Mountain Tunnel	Mountain	38	148
I-77 East River Mountain Tunnel	Mountain	26	244

*Unplanned activities includes tunnel stoppage due to dangerous cargo, over-height detection, farm equipment, debris, wide loads, state police activity, or other emergency maintenance.

**Planned activities includes median/jersey wall repair/installation, paving operations, litter pickup operations, pothole patching operations, rumble strip installation, shoulder repairs, storm drain work, tunnel cleaning operations, and other planned maintenance. This does not include planned construction projects.

Movable Bridges

VaTraffic incidents and work zones for 2020

Facility	# Lifts	Hours Under Advisory for Weather	Hours of Unplanned Lane Impacting Activities*	Hours of Planned Lane Impacting Activities**
I-264 Berkley Bridge	834	7	0	0
I-664 High Rise Bridge	35	291	0	13
US 17 Coleman Bridge	126	1216	0	6
VA 156 Benjamin Harrison Bridge	1027	21	6	0
VA 33 Eltham Bridge	74	0	0	0
US 17 James River Bridge	666	597	1	21
VA 223 Gwynn's Island	2468	0	0	1
VA 175 Chincoteague Bridge	163	n/a	n/a	n/a

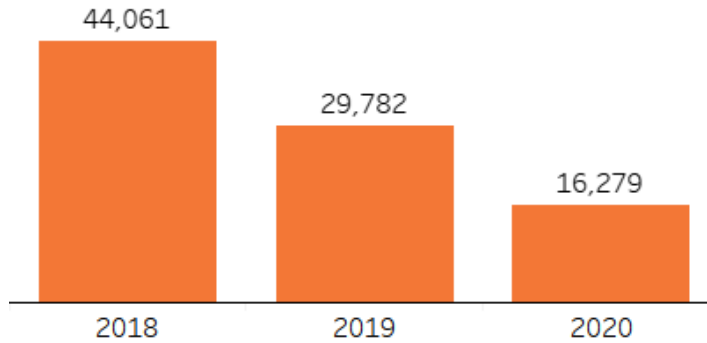
* Unplanned activities includes bridge stoppage due to activities such as dangerous cargo, over-height detection, farm equipment, debris, wide loads, state police activity, or other emergency maintenance.

** Planned activities includes median/jersey wall repair/installation, paving operations, litter pickup operations, pothole patching operations, rumble strip installation, shoulder repairs, storm drain work, and other planned maintenance. This does not include planned construction projects.

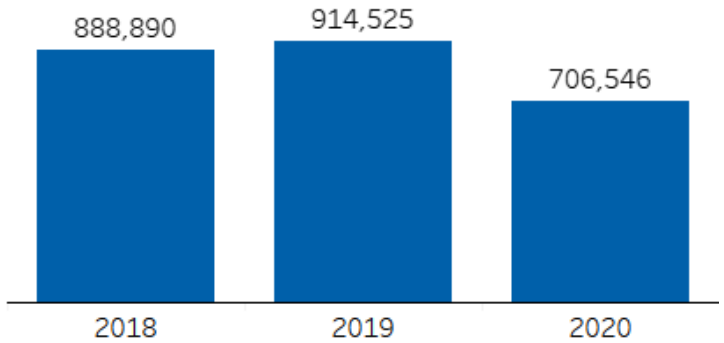
Auto-Ferries

VaTraffic incidents and work zones for 2020

Jamestown-Scotland Ferry - Vehicles Left on Dock



Jamestown-Scotland Ferry - Total Traffic



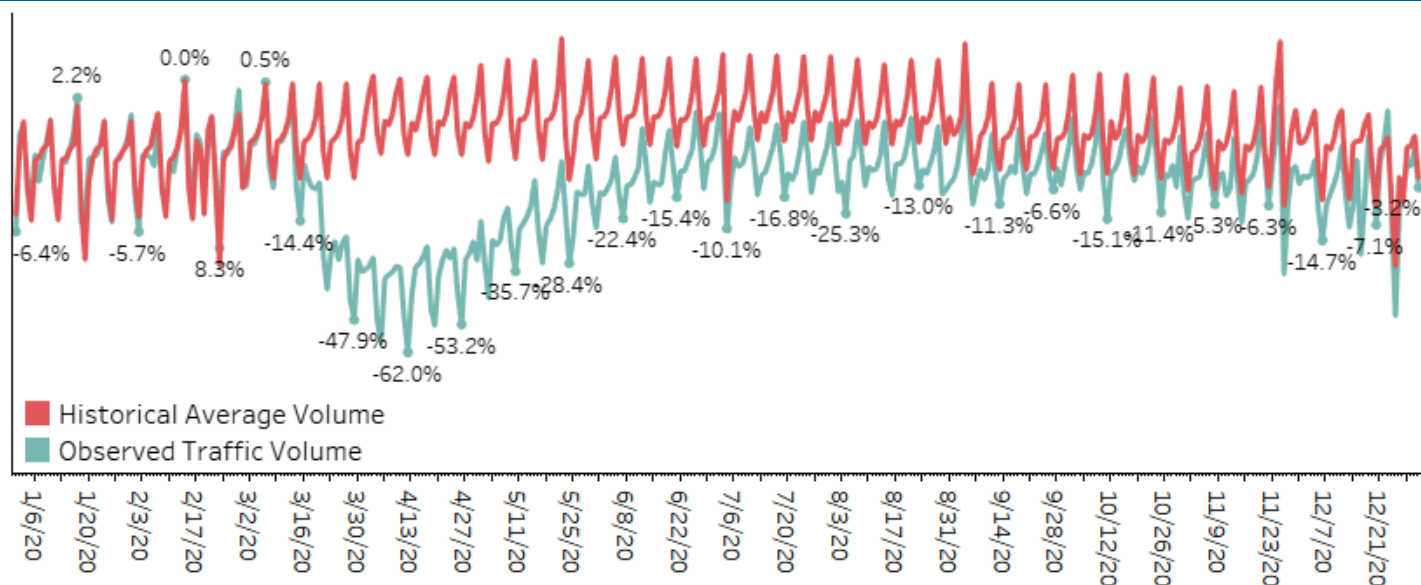
Facility	Hours under Advisory/Closure for Weather	Hours Closed Due to Maintenance
Jamestown-Scotland Ferry	35	46
Merry Point Ferry	0	0
Sunny Bank Ferry	0	0

COVID-19 Impacts

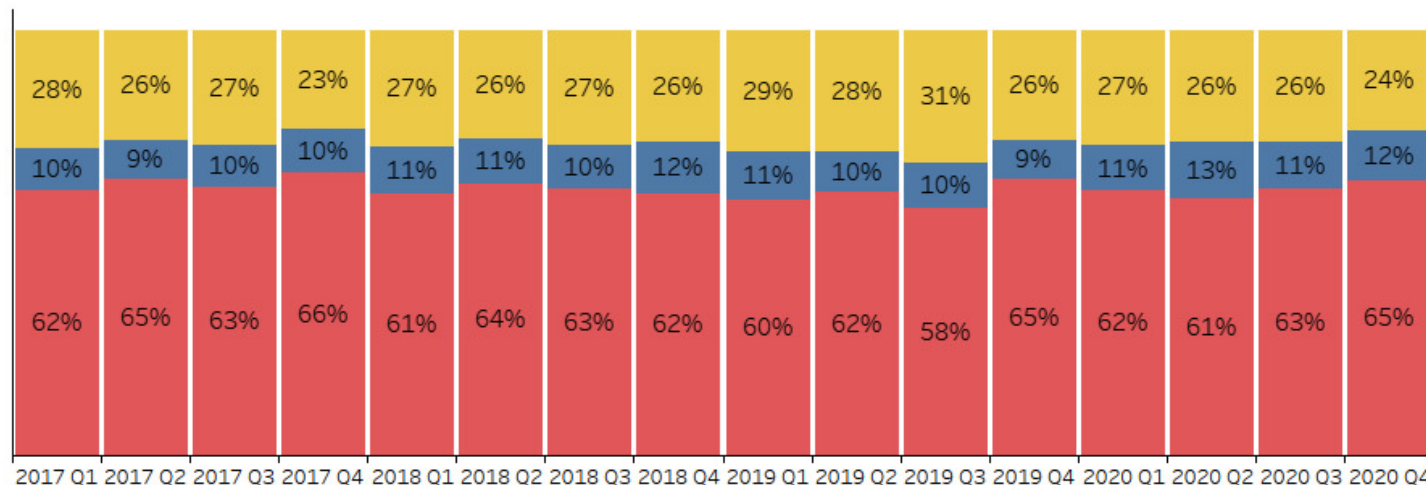
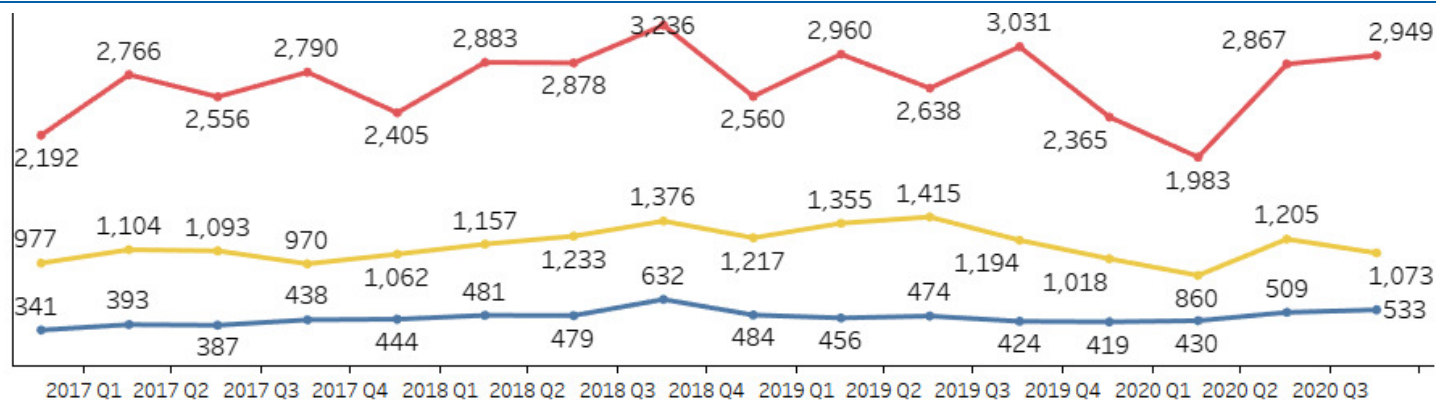
- Jamestown-Scotland Ferry reduced service to one boat on March 15, 2020 due to COVID-19. On May 15, 2020 service resumed to all but 5 trips per day from the normal schedule. On September 11, 2020 the schedule returned to normal.
- Merry Point Ferry suspended service on April 11, 2020 due to COVID-19 and service resumed on July 3, 2020.
- Sunny Bank Ferry suspended service on April 11, 2020 due to COVID-19. In October 2020, Sunny Bank Ferry underwent maintenance. Service resumed in December 2020.

COVID-19 Effects on Traffic

Changes in Traffic Volume in 2020



Incidents by Type



Bristol District

This report compares performance of Interstate Highways from 2019 to 2020

Measure			Target	2019	2020
Total Vehicle Hours of Delay on Interstates The additional hours travelers waited in traffic that is moving 20 mph less than free-flow speed			↘	176K	120K
ALL INCIDENTS	All Roads	All Reported Incidents Number of disabled vehicle and crash incidents	N/A	3,078	2,877
		All Reported Incidents Number of disabled vehicle and crash incidents	N/A	2,236	2,104
	Interstates	Scene Clearance Time Median time from verifying the incident to opening all lanes and shoulders	↘	17	18
		Potential Secondary Crash Incidents Estimated # of crash incidents which could be secondary to other incidents	↘	19	46
LANE IMPACTING INCIDENTS	All Roads	Lane Impacting Incidents # of disabled vehicle and crash incidents that block at least one travel lane	N/A	606	627
		Lane Impacting Incidents # of disabled vehicle and crash incidents that block at least one travel lane	N/A	418	400
	Interstates	Roadway Clearance Time Median time from verifying the incident to opening all travel lanes to traffic	↘	40	42
		Lane Impacting Incidents Cleared in < 30 minutes Percentage of Lane Impacting Incidents that are cleared in less than 30 min	38%	40%	35%
		Lane Impacting Incidents Cleared in < 90 minutes Percentage of Lane Impacting Incidents that are cleared in less than 90 min	81%	85%	82%

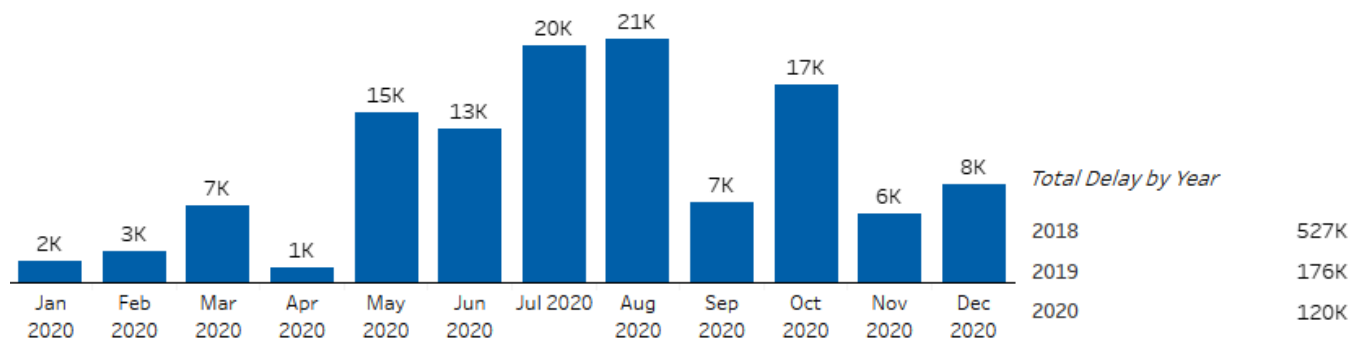
Congestion in 2020



Congestion Overview

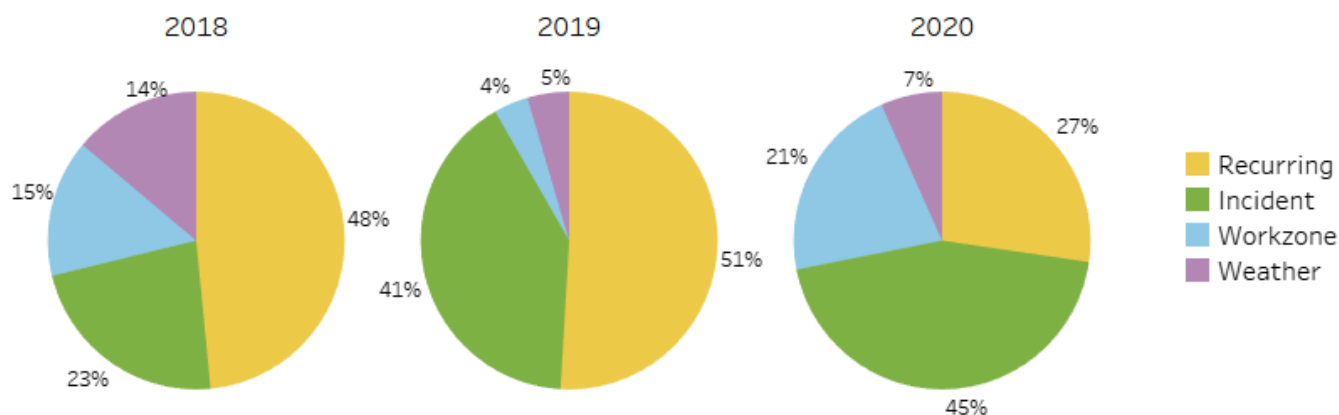
Vehicle Hours of Delay

Total Delay is calculated using INRIX probe speed data and historical VDOT volumes. Delay is calculated when the observed speed is 20 mph or more below free flow conditions.

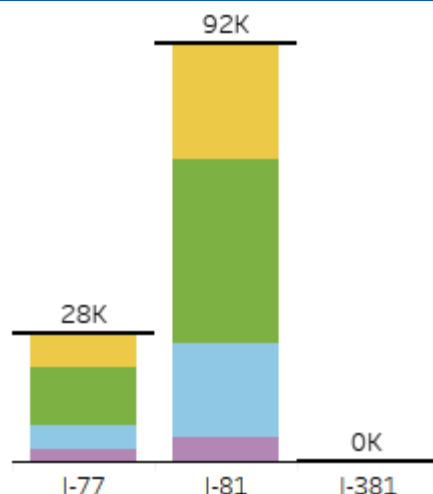


Causes of Congestion

Congestion can be broken down into recurring and non-recurring sources. Recurring congestion is caused by bottlenecks due to high volume or geometric constraints. Sources of non-recurring congestion on interstates include incidents, work zones, and weather events. The amount of congestion due to each of these sources can be estimated at a planning level as shown below.



Delay by Cause & Interstate in 2020



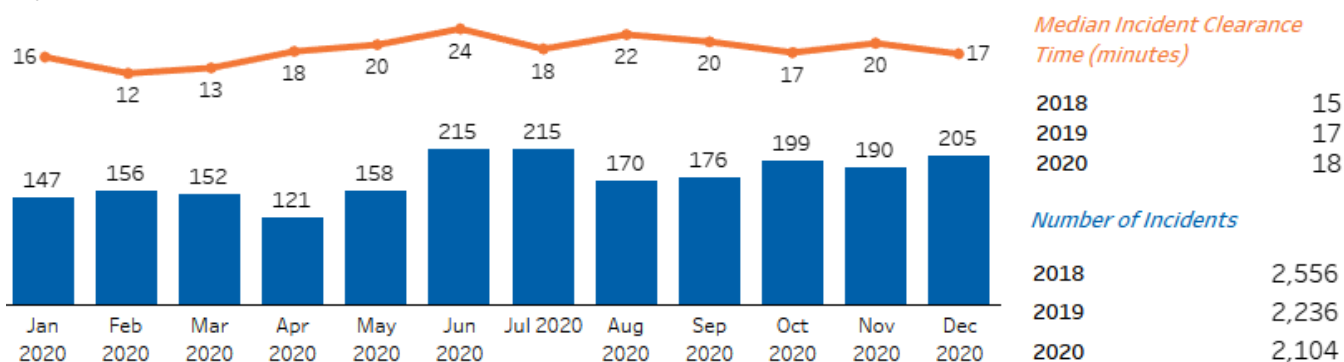


Incidents

Traffic incidents includes both crashes and disabled vehicles and are a frequent cause of non-recurring congestion. Quick clearance programs such as Safety Service Patrols, incident management coordination, and after-action review with the Virginia State Police (VSP) and the other first responders can influence the effects of incidents on traffic.

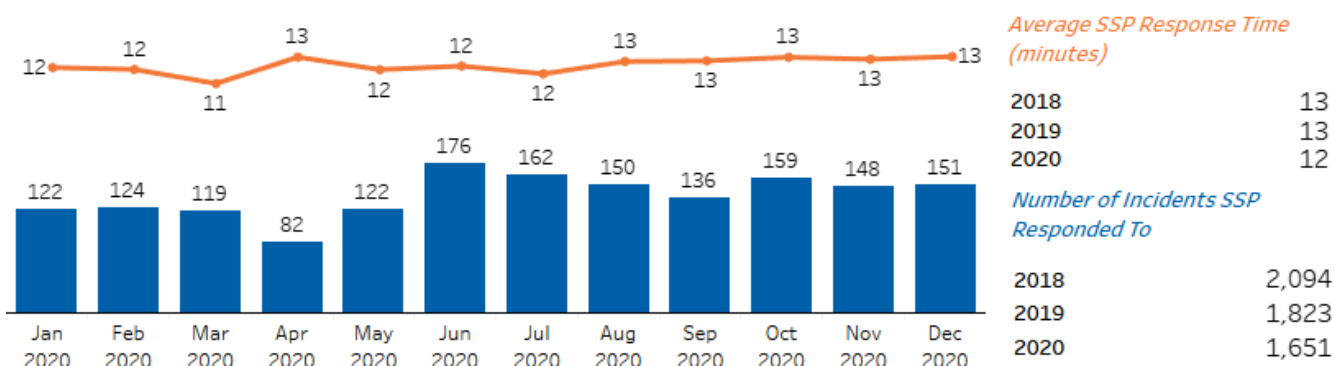
Total Incidents & Incident Clearance Time

Incident Clearance Time (also called Scene Clearance Time) is measures for all crash and disabled vehicle incidents on travel lanes and shoulders. Median Incident Clearance Time is shorter than Median Roadway Clearance Time because it is measures for all incidents, not just those which are lane impacting. A simple incident on a shoulder, such as a vehicle with a flat tire, is often quick to clear.

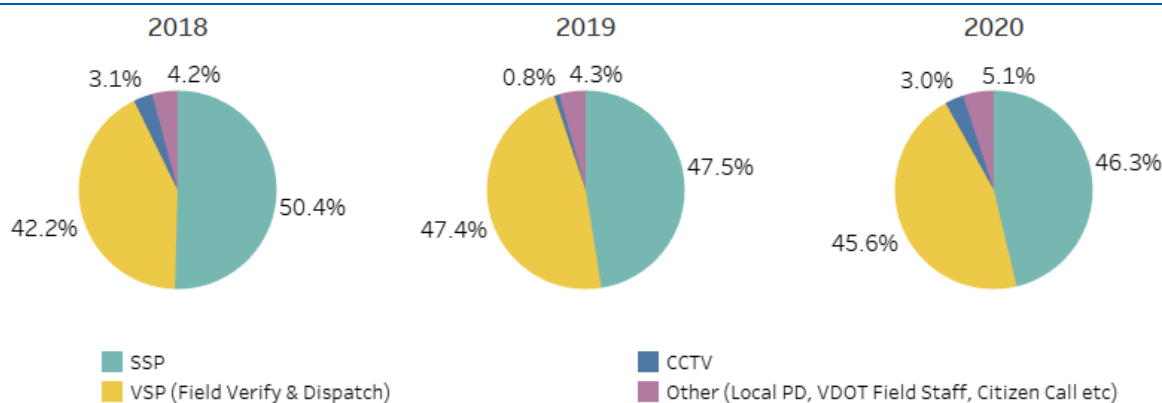


Safety Service Patrol Incident Responses & Response Time

Safety Service Patrol (SSP) Response Time is measured in minutes from the time the SSP Operator was notified to the time they arrived on Scene. This is measured for all disabled vehicle and crash incidents, which an SSP responded to. (Average Response Time between 2 and 60 minutes is measured)

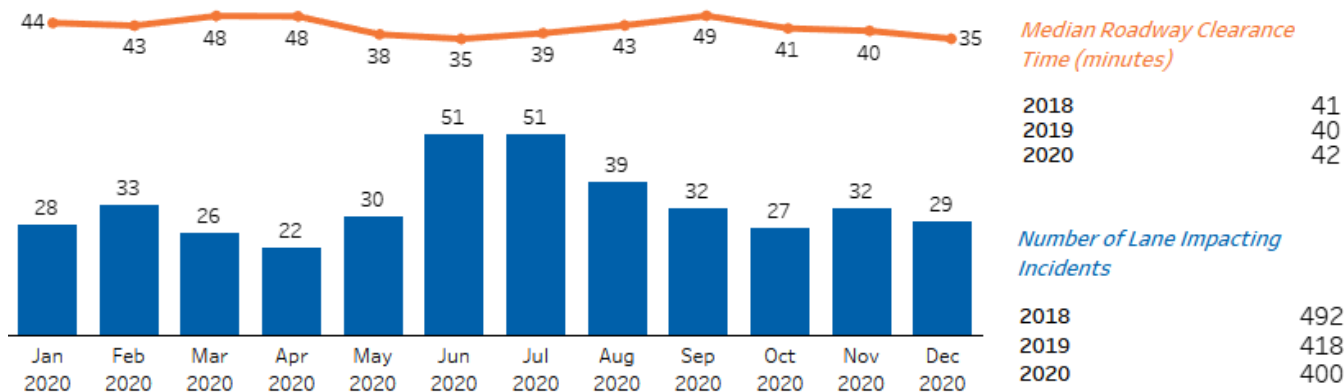


All Incidents by Detection Source



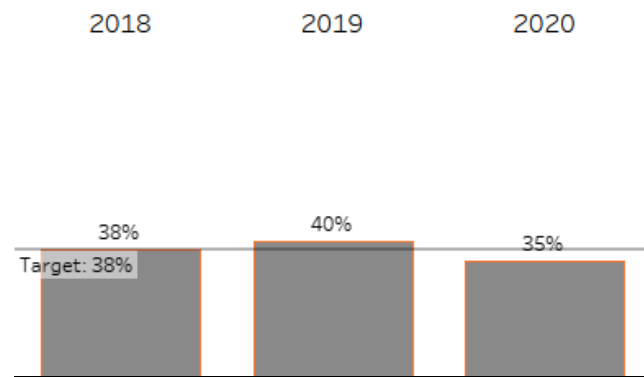
Lane Impacting Incidents & Roadway Clearance Time

Roadway Clearance Time (RCT) is measured for all disabled vehicle and crash incidents that block at least one travel lane during the course of the incident. RCT is measured from the start of the incident to when all travel lanes are clear and open to traffic.

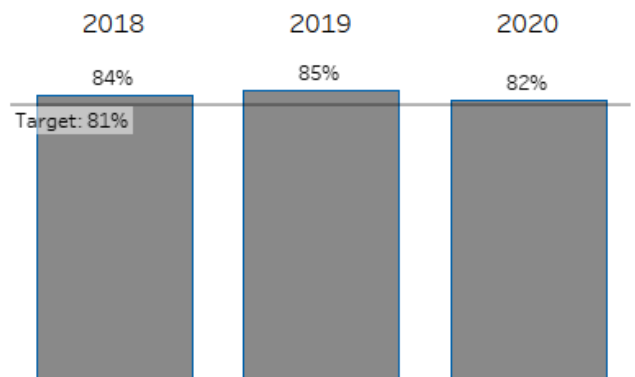


Lane Impacting Incidents by Roadway Clearance Time

Lane Impacting Incidents Cleared in <30 minutes

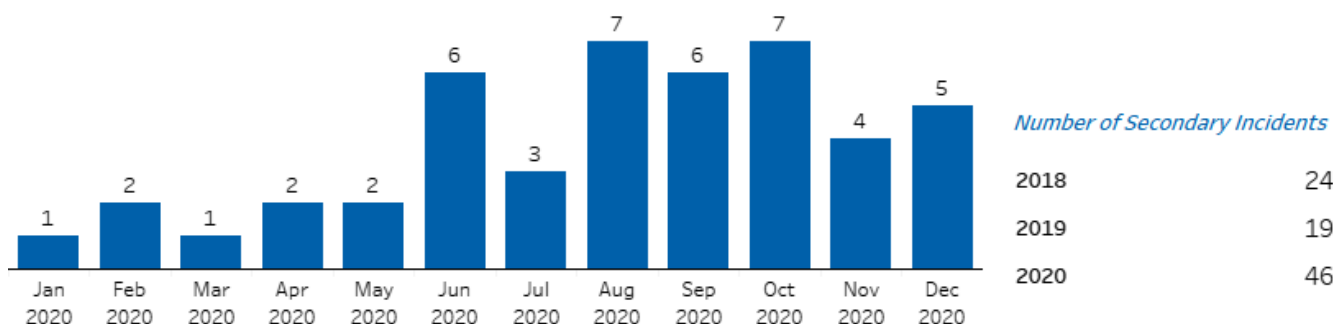


Lane Impacting Incidents Cleared in <90 minutes



Potential Secondary Incidents

The estimated number of crash incidents which could be secondary to other crash or disable vehicle incidents.





Work Zones

VDOT measures the number and types of work events and the impact on non-recurring congestion. The allowable work hours are regularly reviewed to promote safety and reduce congestion.

Work Zones by Interstate

Work zone event data from VaTraffic

	Number of Lane Impacting Work Zones		Mile - Hours of Lane Impacting Work Zones	
	2019	2020	2019	2020
I-77	103	201	2,590	4,719
I-81	393	627	10,628	15,168
I-381		4		25
Grand Total	496	832	13,218	19,912

Work event types include: new roadway construction; road widening; resurfacing; paving; bridge replacement; bridge joint, approach, deck, and superstructure repairs; bridge inspections; pavement marking installation; ITS equipment repair and installation; tunnel cleaning; and overhead sign structure repairs. Long-term work zones (>7 days) were not included.



Weather

VDOT measures the number and types of weather events and the impact on non-recurring congestion. The data helps identify emerging maintenance trends.

Short Term Weather Events

Number of weather events/incidents

Type	2019	2020
Other	2	2

Long Term Weather Events (Road Condition)

Mile-Hours of Interstate reported in condition other than "open"

Weather Event	Road Condition	2019	2020
Snow/Ice	Minor	3,542	7,554
	Moderate	247	777



Operations Assets

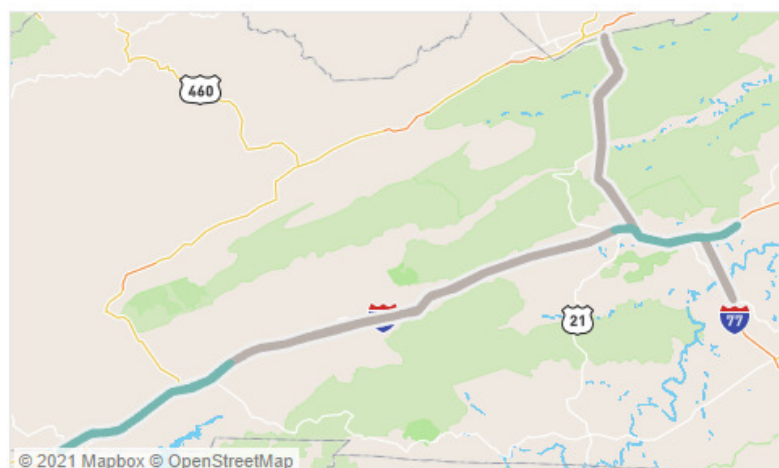
Cameras, Signs, and Safety Service Patrols are among the tools used to manage and minimize traffic congestion due to both recurring and non-recurring causes. VDOT measures the coverage areas and condition of these assets that help monitor traffic and improve mobility.

ITS Assets Availability – SWRO, 2020

Device Type	Number of Devices	% of Time Devices were Online
CCTV	240	96.4%
CCTV Portable	18	99.7%
CMS	95	96.4%
CMS Portable	26	95.5%

Safety Service Patrol Coverage

Coverage as of December 31, 2020



SSP Coverage Legend (Hours Per Day/Days Per Week)

16/7 No SSP

Interstate	Miles Covered	% Miles Covered	Mile-Hours Covered / Week	% Mile-Hours / Week
I-77	0	0%	0	0%
I-81	44	51%	4,256	29%
I-381	0	0%	0	0%
Grand Total	44	36%	4,256	21%

Camera Coverage

Cameras (CCTV) as of December 31, 2020

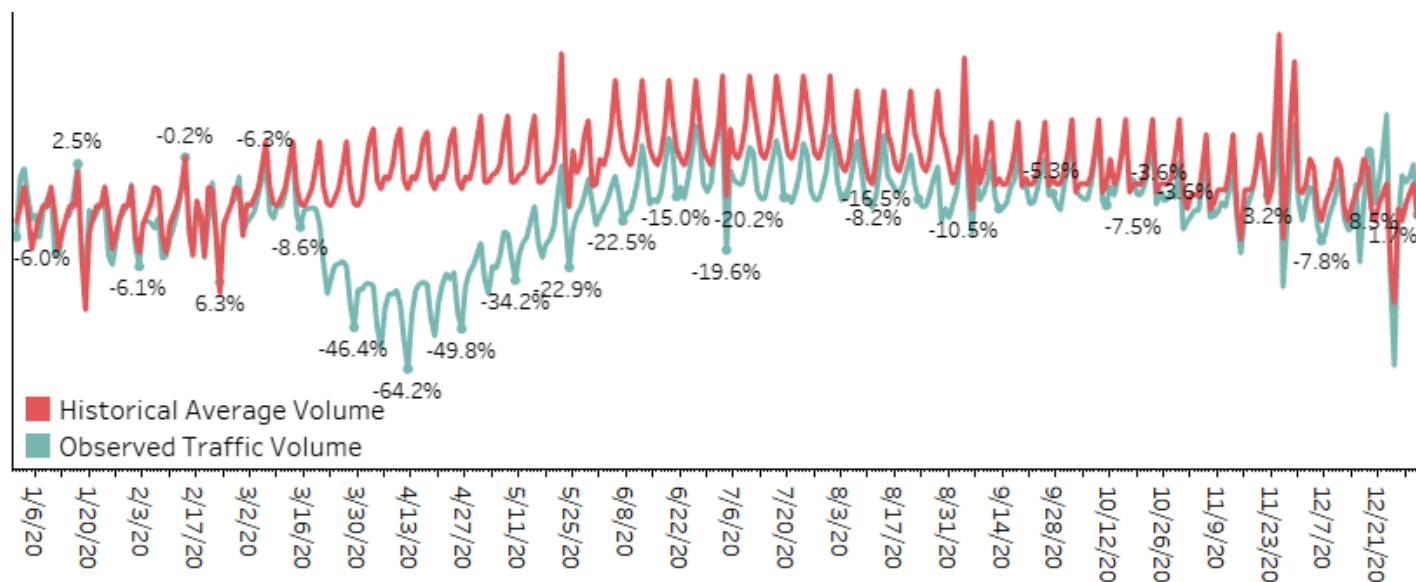


Interstate	Estimated Miles Covered by Cameras	Estimated % Miles Covered by CCTV
I-77	35	41%
I-81	86	42%
I-381	2	43%
Grand Total	123	42%

Coverage assumes that cameras can only see one side of the interstate unless it is in the median. 1 mile upstream and downstream is assumed to be covered by each camera.

COVID-19 Effects on Traffic

Changes in traffic volume in 2020

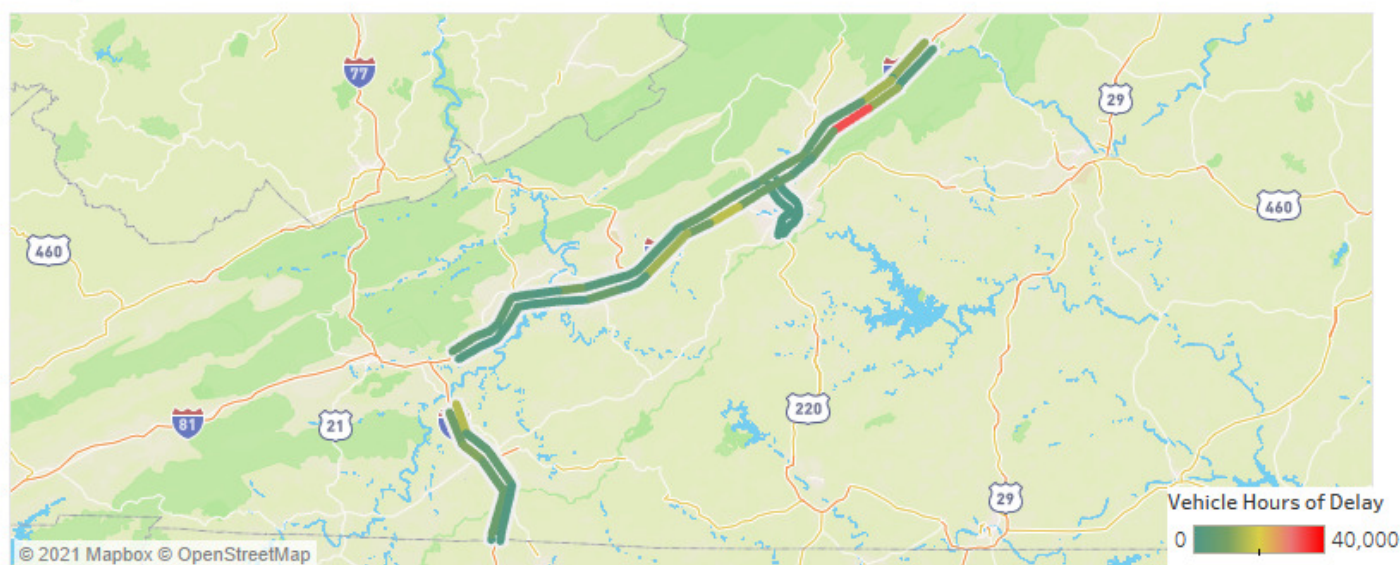


Salem District

This report compares performance of Interstate Highways from 2019 to 2020

Measure			Target	2019	2020
Total Vehicle Hours of Delay on Interstates The additional hours travelers waited in traffic that is moving 20 mph less than free-flow speed			↘	554K	329K
ALL INCIDENTS	All Roads	All Reported Incidents Number of disabled vehicle and crash incidents	N/A	9,244	7,553
	Interstates	All Reported Incidents Number of disabled vehicle and crash incidents	N/A	7,107	5,837
		Scene Clearance Time Median time from verifying the incident to opening all lanes and shoulders	↘	15	16
		Potential Secondary Crash Incidents Estimated # of crash incidents which could be secondary to other incidents	↘	101	78
LANE IMPACTING INCIDENTS	All Roads	Lane Impacting Incidents # of disabled vehicle and crash incidents that block at least one travel lane	N/A	1,550	1,408
	Interstates	Lane Impacting Incidents # of disabled vehicle and crash incidents that block at least one travel lane	N/A	832	745
		Roadway Clearance Time Median time from verifying the incident to opening all travel lanes to traffic	↘	46	52
		Lane Impacting Incidents Cleared in < 30 minutes Percentage of Lane Impacting Incidents that are cleared in less than 30 min	33%	33%	26%
		Lane Impacting Incidents Cleared in < 90 minutes Percentage of Lane Impacting Incidents that are cleared in less than 90 min	81%	84%	78%

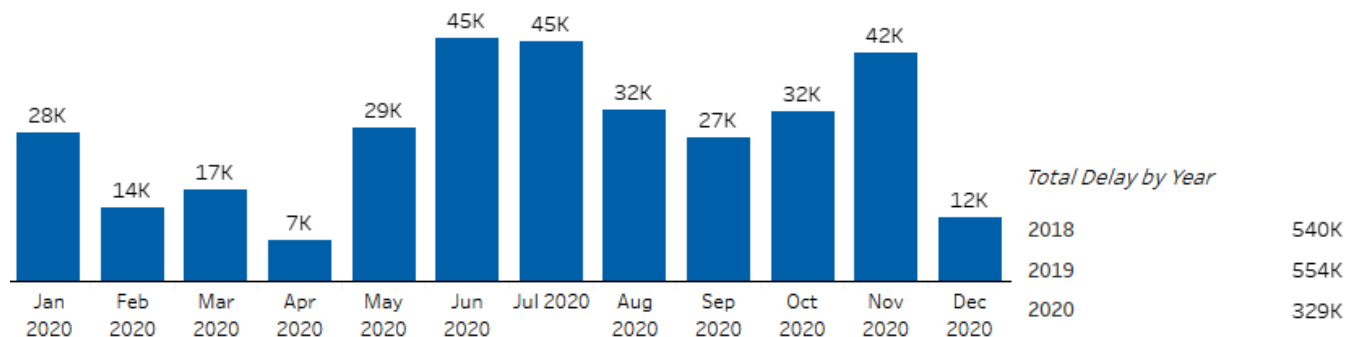
Congestion in 2020



Congestion Overview

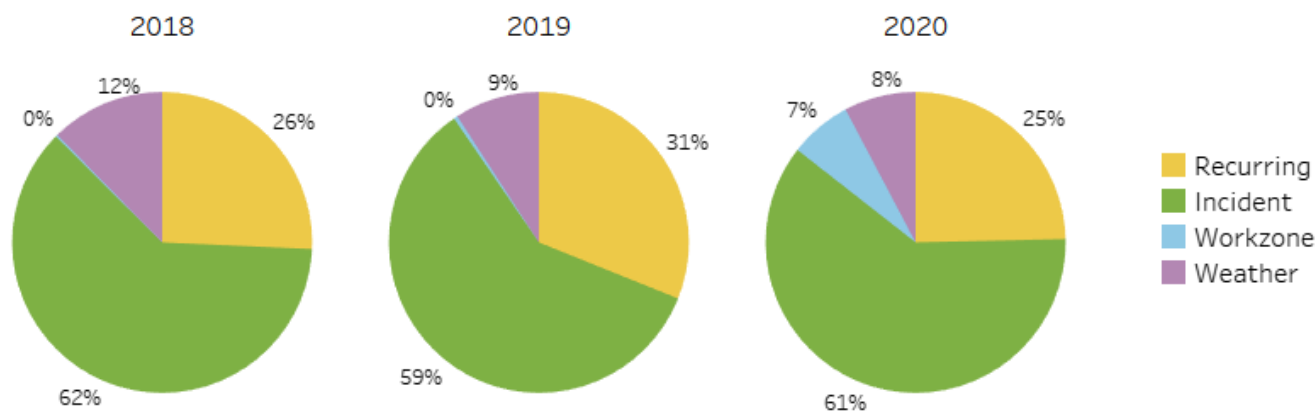
Vehicle Hours of Delay

Total Delay is calculated using INRIX probe speed data and historical VDOT volumes. Delay is calculated when the observed speed is 20 mph or more below free flow conditions.

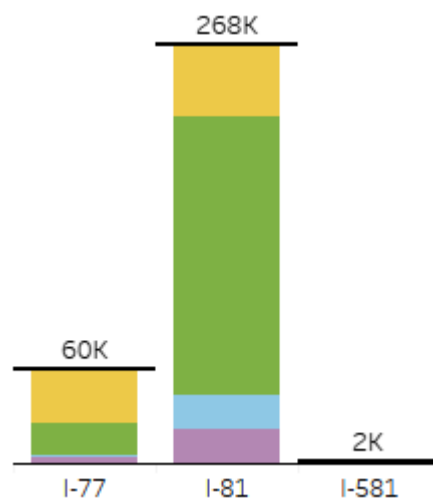


Causes of Congestion

Congestion can be broken down into recurring and non-recurring sources. Recurring congestion is caused by bottlenecks due to high volume or geometric constraints. Sources of non-recurring congestion on interstates include incidents, work zones, and weather events. The amount of congestion due to each of these sources can be estimated at a planning level as shown below.



Delay by Cause & Interstate in 2020



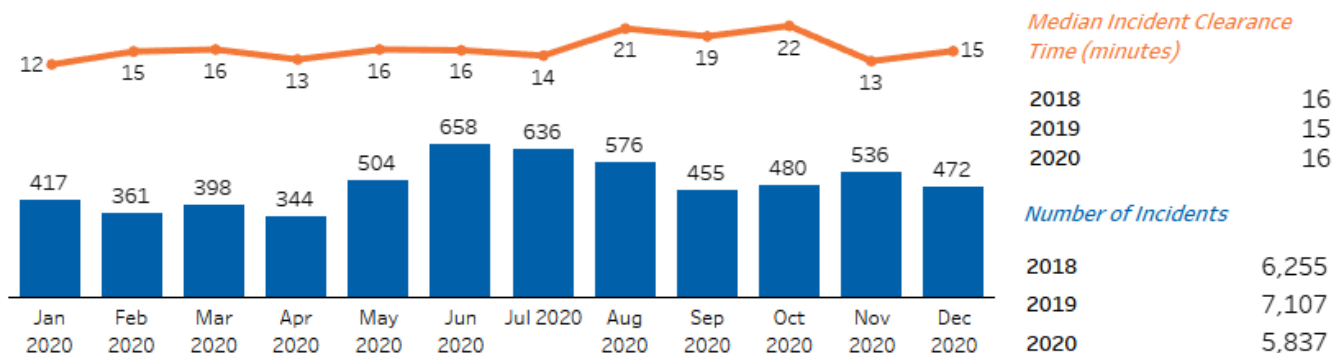


Incidents

Traffic incidents includes both crashes and disabled vehicles and are a frequent cause of non-recurring congestion. Quick clearance programs such as Safety Service Patrols, incident management coordination, and after-action review with the Virginia State Police (VSP) and the other first responders can influence the effects of incidents on traffic.

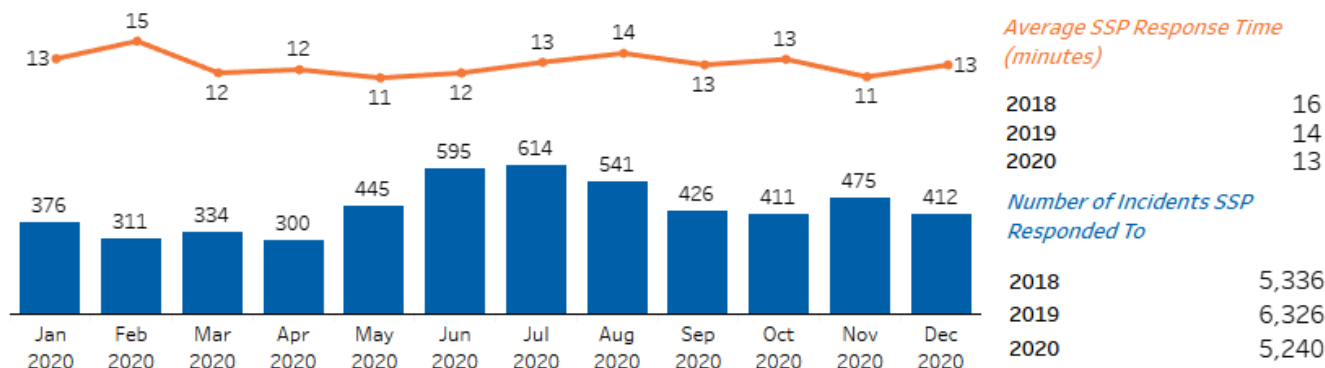
Total Incidents & Incident Clearance Time

Incident Clearance Time (also called Scene Clearance Time) is measures for all crash and disabled vehicle incidents on travel lanes and shoulders. Median Incident Clearance Time is shorter than Median Roadway Clearance Time because it is measures for all incidents, not just those which are lane impacting. A simple incident on a shoulder, such as a vehicle with a flat tire, is often quick to clear.

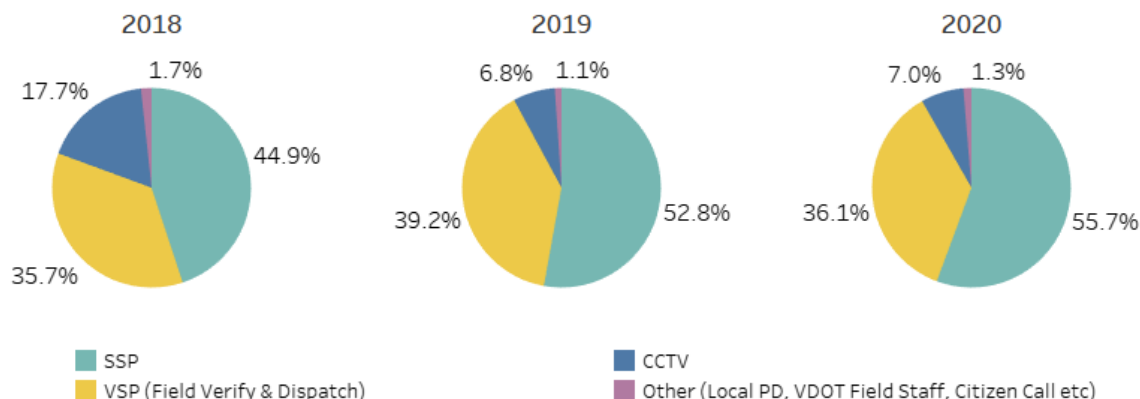


Safety Service Patrol Incident Responses & Response Time

Safety Service Patrol (SSP) Response Time is measured in minutes from the time the SSP Operator was notified to the time they arrived on Scene. This is measured for all disabled vehicle and crash incidents, which an SSP responded to. (Average Response Time between 2 and 60 minutes is measured)

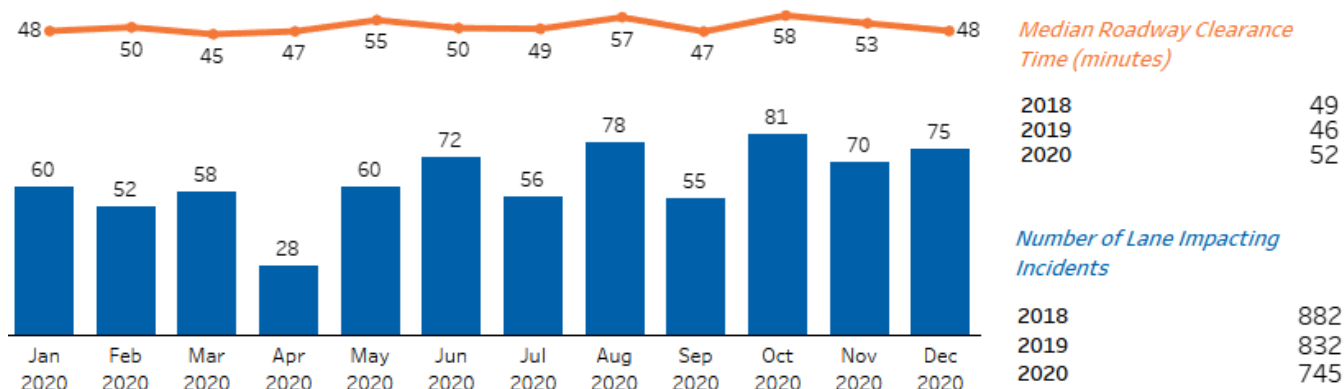


All Incidents by Detection Source



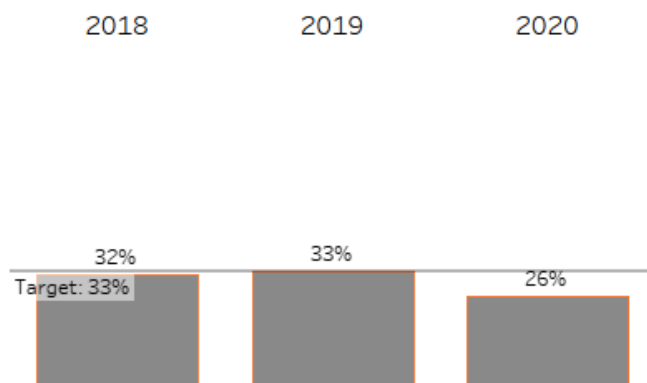
Lane Impacting Incidents & Roadway Clearance Time

Roadway Clearance Time (RCT) is measured for all disabled vehicle and crash incidents that block at least one travel lane during the course of the incident. RCT is measured from the start of the incident to when all travel lanes are clear and open to traffic.

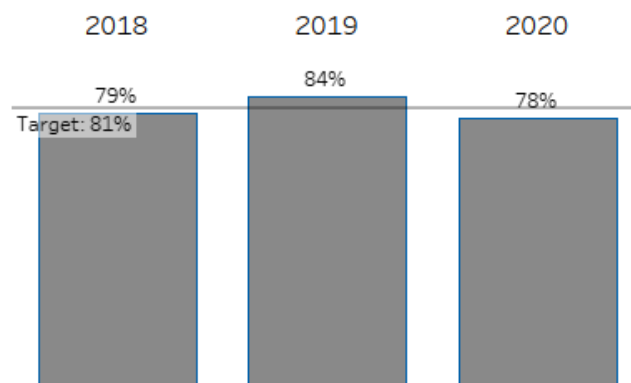


Lane Impacting Incidents by Roadway Clearance Time

Lane Impacting Incidents Cleared in <30 minutes

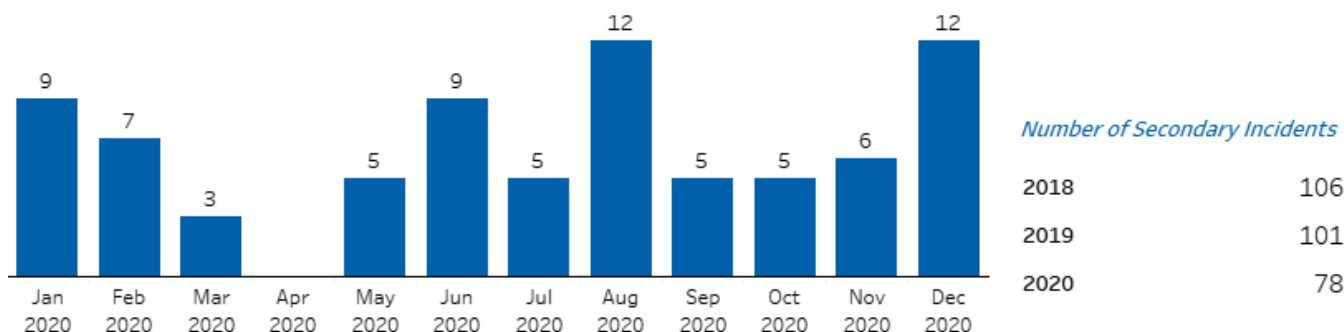


Lane Impacting Incidents Cleared in <90 minutes



Potential Secondary Incidents

The estimated number of crash incidents which could be secondary to other crash or disable vehicle incidents.





Work Zones

VDOT measures the number and types of work events and the impact on non-recurring congestion. The allowable work hours are regularly reviewed to promote safety and reduce congestion.

Work Zones by Interstate

Work zone event data from VaTraffic

	Number of Lane Impacting Work Zones		Mile - Hours of Lane Impacting Work Zones	
	2019	2020	2019	2020
I-77	55	79	800	1,947
I-81	528	1,102	8,536	22,229
I-581	65	40	936	781
Grand Total	648	1,221	10,272	24,958

Work event types include: new roadway construction; road widening; resurfacing; paving; bridge replacement; bridge joint, approach, deck, and superstructure repairs; bridge inspections; pavement marking installation; ITS equipment repair and installation; tunnel cleaning; and overhead sign structure repairs. Long-term work zones (>7 days) were not included.



Weather

VDOT measures the number and types of weather events and the impact on non-recurring congestion. The data helps identify emerging maintenance trends.

Short Term Weather Events

Number of weather events/incidents

Type	2019	2020
Fog	230	349
High Wind	156	251
Standing Water (Ponding)		2
Other	3	3

Long Term Weather Events (Road Condition)

Mile-Hours of Interstate reported in condition other than "open"

Weather Event	Road Condition	2019	2020
Snow/Ice	Minor	3,679	1,237
	Moderate	769	301



Operations Assets

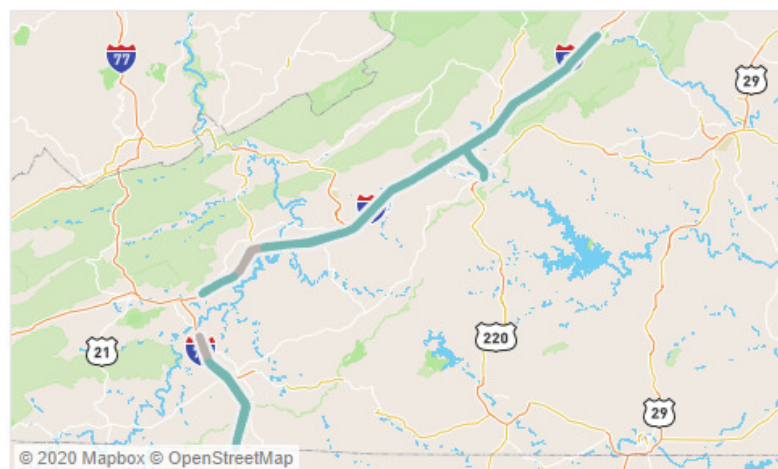
Cameras, Signs, and Safety Service Patrols are among the tools used to manage and minimize traffic congestion due to both recurring and non-recurring causes. VDOT measures the coverage areas and condition of these assets that help monitor traffic and improve mobility.

ITS Assets Availability - SWRO, 2020

Device Type	Number of Devices	% of Time Devices were Online
CCTV	240	96.4%
CCTV Portable	18	99.7%
CMS	95	96.4%
CMS Portable	26	95.5%

Safety Service Patrol Coverage

Coverage as of December 31, 2020



Interstate	Miles Covered	% Miles Covered	Mile-Hours Covered / Week	% Mile-Hours / Week
I-77	19	79%	2,128	53%
I-81	74	83%	8,960	60%
I-581	6	100%	672	67%
Grand Total	99	83%	11,760	59%

Camera Coverage

Cameras (CCTV) as of December 31, 2020

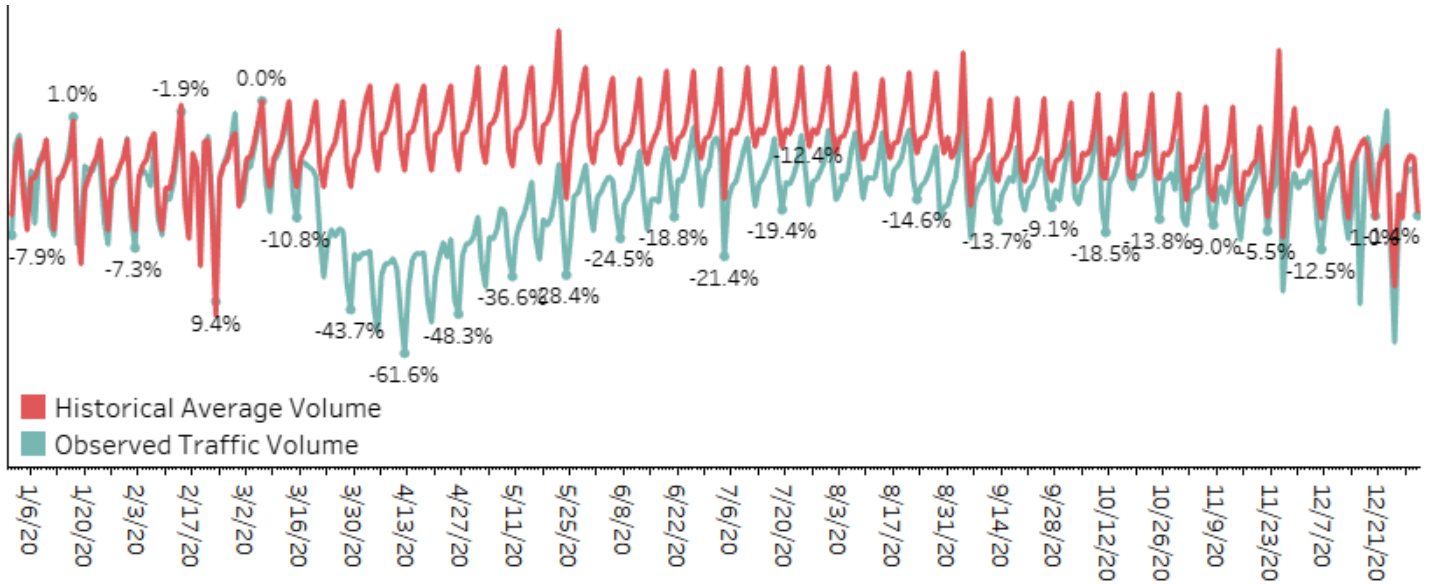


Interstate	Estimated Miles Covered by Cameras	Estimated % Miles Covered by CCTV
I-77	24	59%
I-81	89	46%
I-581	6	34%
Grand Total	119	48%

Coverage assumes that cameras can only see one side of the interstate unless it is in the median. 1 mile upstream and downstream is assumed to be covered by each camera.





COVID-19 Effects on Traffic

Changes in traffic volume in 2020

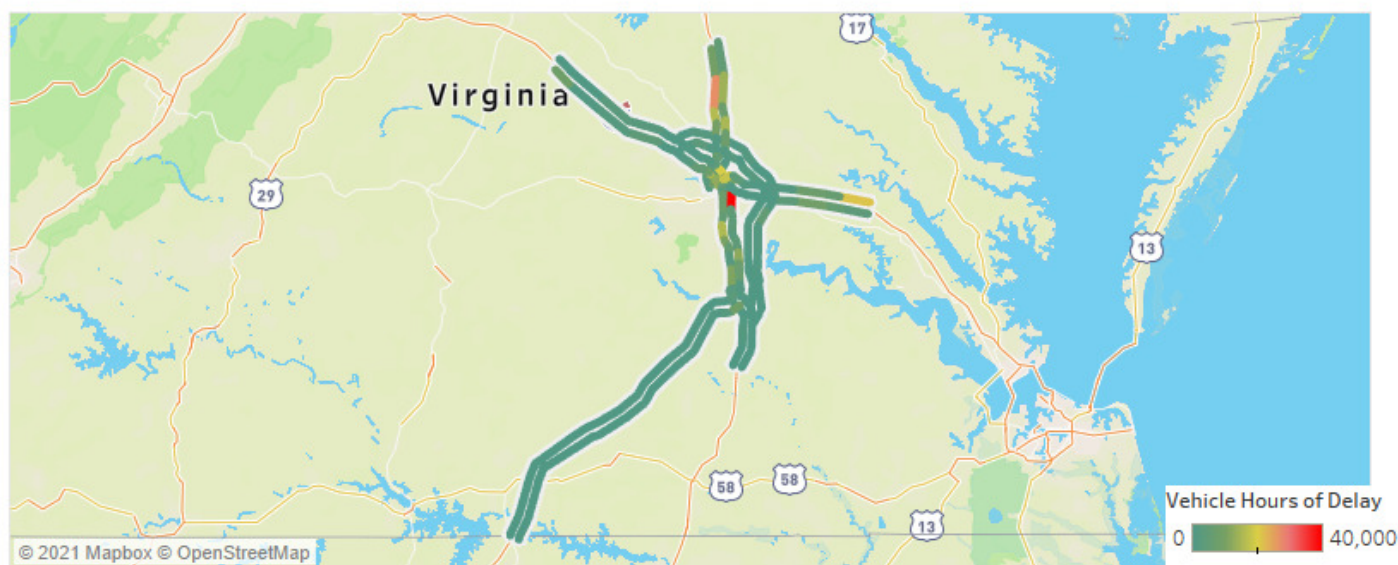


Richmond District

This report compares performance of Interstate Highways from 2019 to 2020

Measure			Target	2019	2020
Total Vehicle Hours of Delay on Interstates The additional hours travelers waited in traffic that is moving 20 mph less than free-flow speed				1,460K	571K
ALL INCIDENTS	Roads All	All Reported Incidents Number of disabled vehicle and crash incidents	N/A	27,237	24,385
		All Reported Incidents Number of disabled vehicle and crash incidents	N/A	23,803	21,141
	Interstates	Scene Clearance Time Median time from verifying the incident to opening all lanes and shoulders		17	16
		Potential Secondary Crash Incidents Estimated # of crash incidents which could be secondary to other incidents		891	647
LANE IMPACTING INCIDENTS	Roads All	Lane Impacting Incidents # of disabled vehicle and crash incidents that block at least one travel lane	N/A	4,679	4,370
		Lane Impacting Incidents # of disabled vehicle and crash incidents that block at least one travel lane	N/A	3,524	3,278
	Interstates	Roadway Clearance Time Median time from verifying the incident to opening all travel lanes to traffic		33	42
		Lane Impacting Incidents Cleared in < 30 minutes Percentage of Lane Impacting Incidents that are cleared in less than 30 min	42%	47%	39%
		Lane Impacting Incidents Cleared in < 90 minutes Percentage of Lane Impacting Incidents that are cleared in less than 90 min	86%	91%	88%

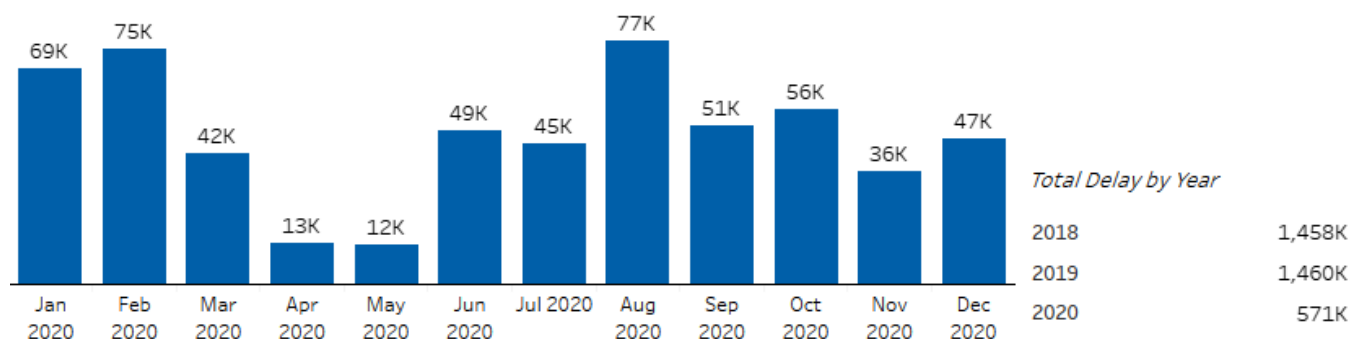
Congestion in 2020



Congestion Overview

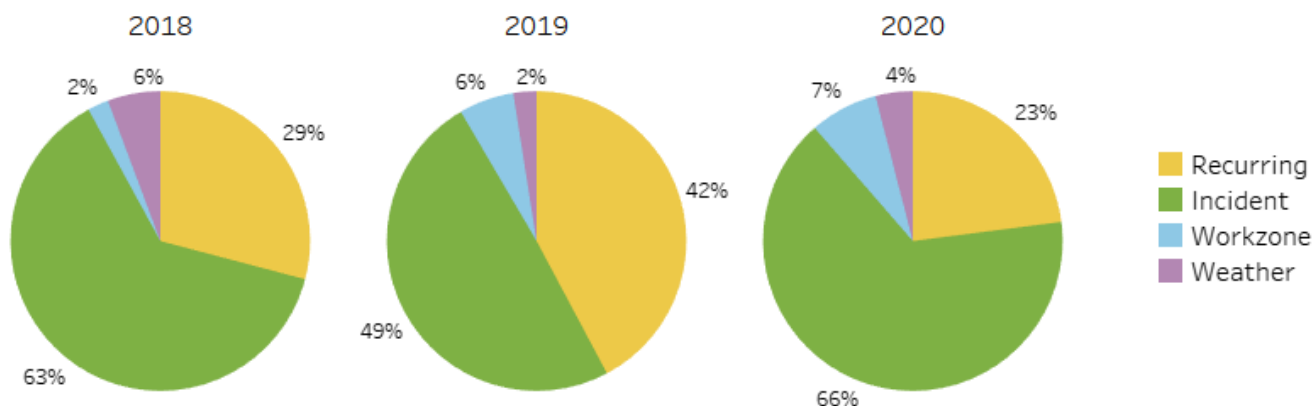
Vehicle Hours of Delay

Total Delay is calculated using INRIX probe speed data and historical VDOT volumes. Delay is calculated when the observed speed is 20 mph or more below free flow conditions.

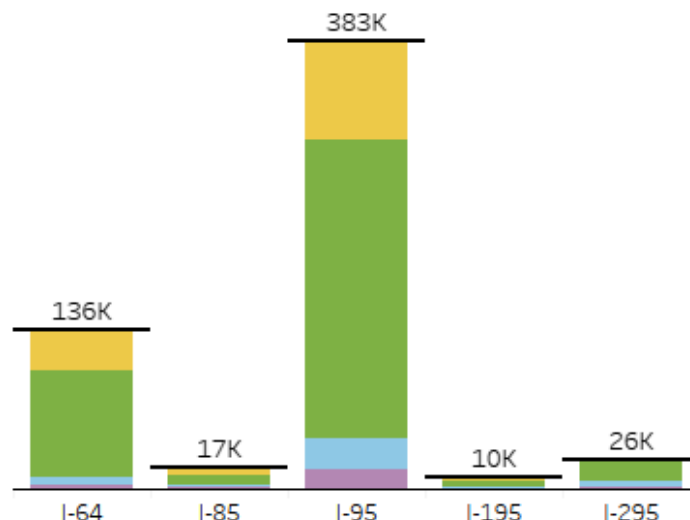


Causes of Congestion

Congestion can be broken down into recurring and non-recurring sources. Recurring congestion is caused by bottlenecks due to high volume or geometric constraints. Sources of non-recurring congestion on interstates include incidents, work zones, and weather events. The amount of congestion due to each of these sources can be estimated at a planning level as shown below.



Delay by Cause & Interstate in 2020



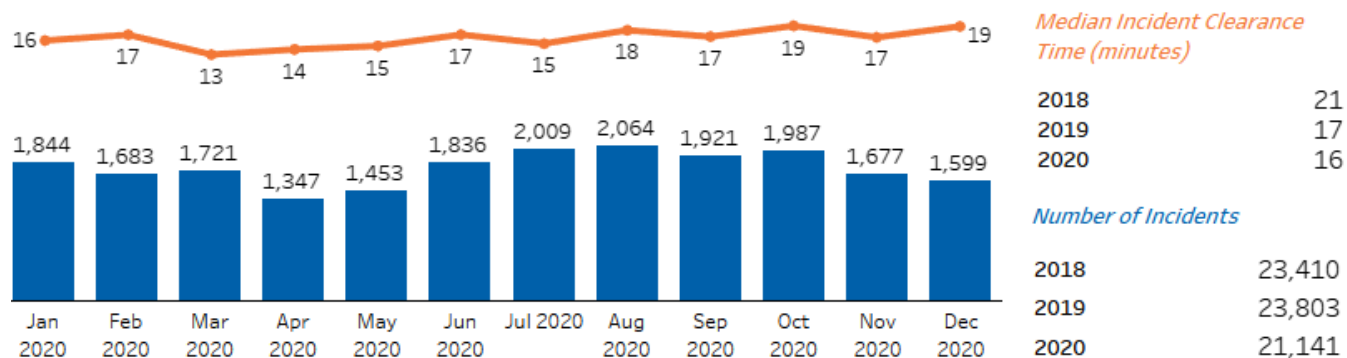


Incidents

Traffic incidents includes both crashes and disabled vehicles and are a frequent cause of non-recurring congestion. Quick clearance programs such as Safety Service Patrols, incident management coordination, and after-action review with the Virginia State Police (VSP) and the other first responders can influence the effects of incidents on traffic.

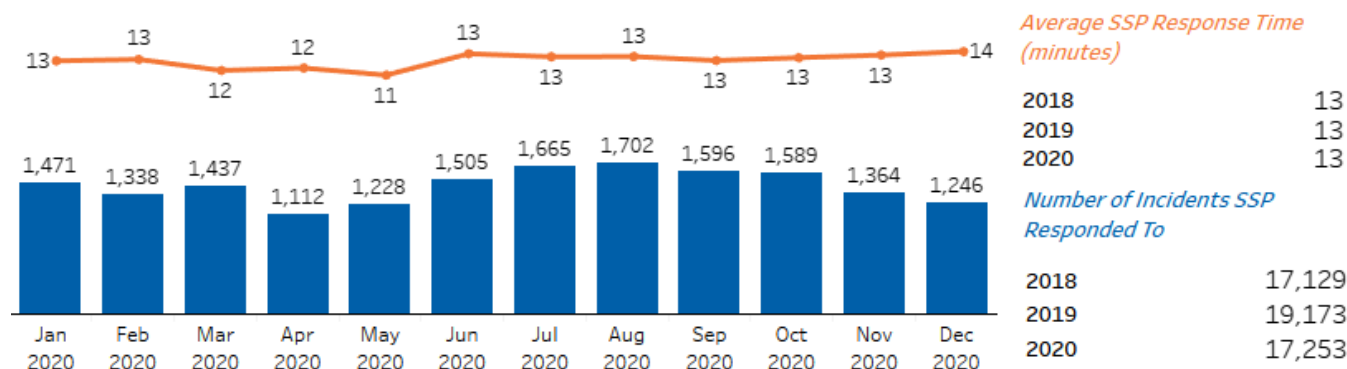
Total Incidents & Incident Clearance Time

Incident Clearance Time (also called Scene Clearance Time) is measures for all crash and disabled vehicle incidents on travel lanes and shoulders. Median Incident Clearance Time is shorter than Median Roadway Clearance Time because it is measures for all incidents, not just those which are lane impacting. A simple incident on a shoulder, such as a vehicle with a flat tire, is often quick to clear.

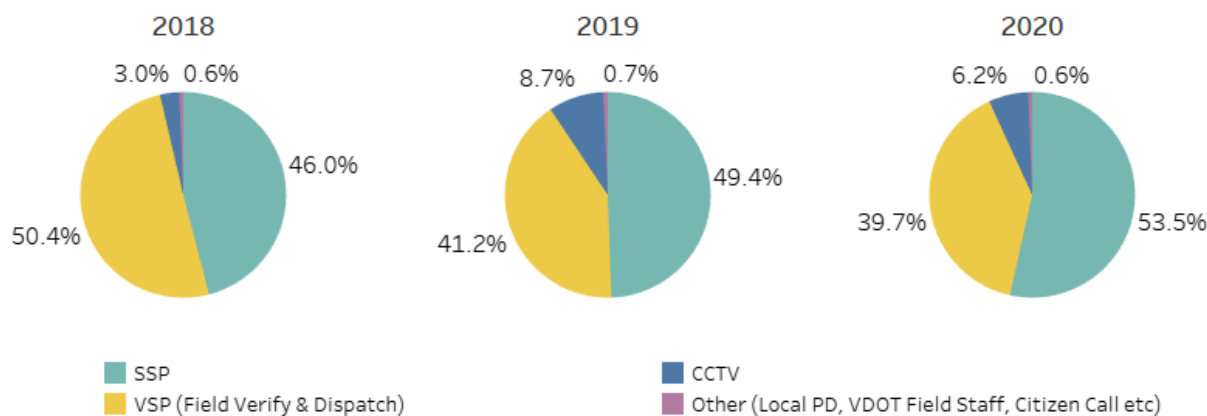


Safety Service Patrol Incident Responses & Response Time

Safety Service Patrol (SSP) Response Time is measured in minutes from the time the SSP Operator was notified to the time they arrived on Scene. This is measured for all disabled vehicle and crash incidents, which an SSP responded to. (Average Response Time between 2 and 60 minutes is measured)

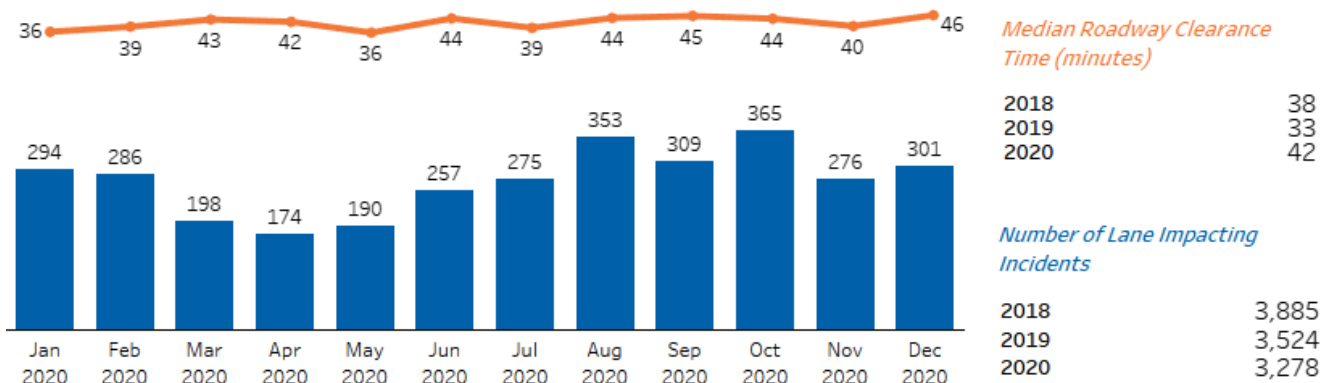


All Incidents by Detection Source



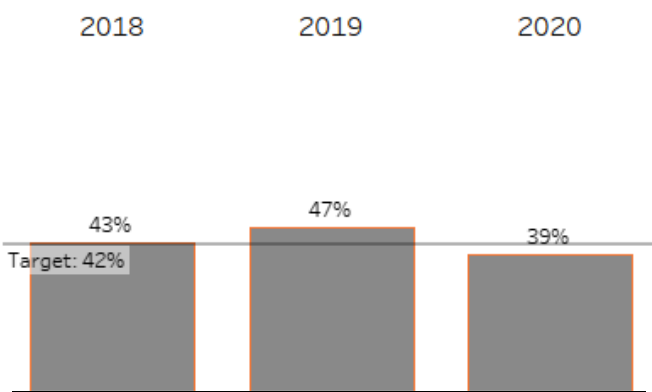
Lane Impacting Incidents & Roadway Clearance Time

Roadway Clearance Time (RCT) is measured for all disabled vehicle and crash incidents that block at least one travel lane during the course of the incident. RCT is measured from the start of the incident to when all travel lanes are clear and open to traffic.

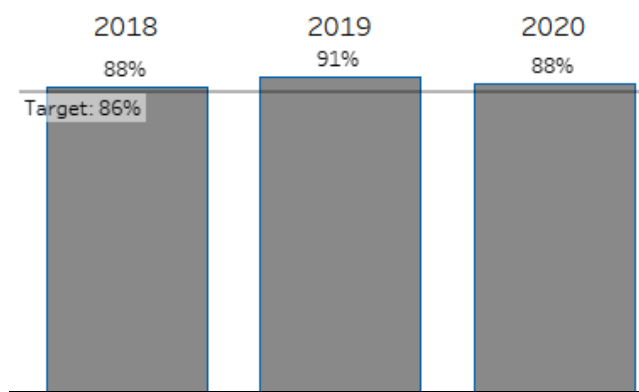


Lane Impacting Incidents by Roadway Clearance Time

Lane Impacting Incidents Cleared in <30 minutes

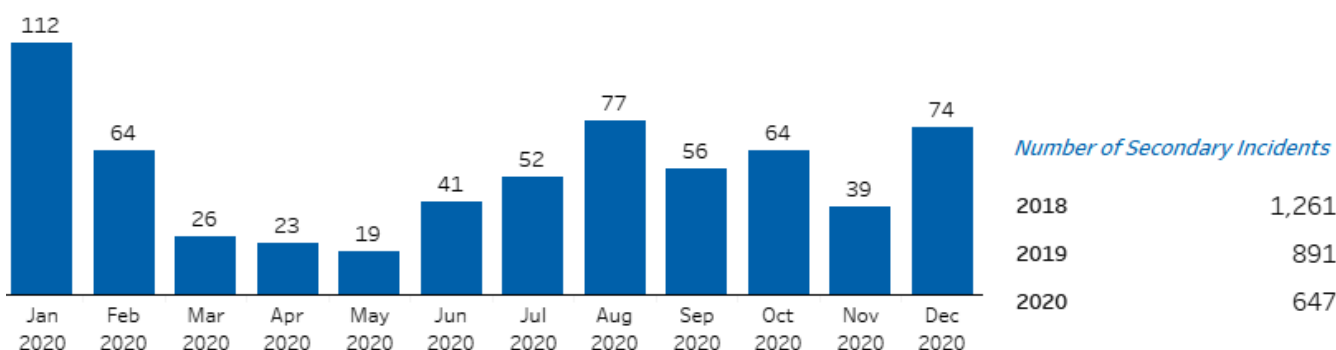


Lane Impacting Incidents Cleared in <90 minutes



Potential Secondary Incidents

The estimated number of crash incidents which could be secondary to other crash or disable vehicle incidents.





Work Zones

VDOT measures the number and types of work events and the impact on non-recurring congestion. The allowable work hours are regularly reviewed to promote safety and reduce congestion.

Work Zones by Interstate

Work zone event data from VaTraffic

	Number of Lane Impacting Work Zones		Mile - Hours of Lane Impacting Work Zones	
	2019	2020	2019	2020
I-64	789	879	24,879	17,967
I-85	257	398	9,965	22,913
I-95	684	660	10,816	12,646
I-195	282	56	6,529	562
I-295	747	1,226	16,027	20,559
Grand Total	2,759	3,219	68,215	74,647

Work event types include: new roadway construction; road widening; resurfacing; paving; bridge replacement; bridge joint, approach, deck, and superstructure repairs; bridge inspections; pavement marking installation; ITS equipment repair and installation; tunnel cleaning; and overhead sign structure repairs. Long-term work zones (>7 days) were not included.



Weather

VDOT measures the number and types of weather events and the impact on non-recurring congestion. The data helps identify emerging maintenance trends.

Short Term Weather Events

Number of weather events/incidents

Type	2019	2020
Fog	3	9
High Wind		5
Icy Conditions	7	14
Standing Water (Ponding)	28	23
Other	121	164

Long Term Weather Events (Road Condition)

Mile-Hours of Interstate reported in condition other than "open"

Weather Event	Road Condition	2019	2020
Flood	Closed	50	
Snow/Ice	Minor	8,262	1,382
	Moderate	232	



Operations Assets

Cameras, Signs, and Safety Service Patrols are among the tools used to manage and minimize traffic congestion due to both recurring and non-recurring causes. VDOT measures the coverage areas and condition of these assets that help monitor traffic and improve mobility.

ITS Assets Availability - CRO, 2020

Device Type	Number of Devices	% of Time Devices were Online
CCTV	87	96.9%
CCTV Portable	1	95.3%
CMS	15	92.8%
CMS Portable	19	97.6%

Safety Service Patrol Coverage

Coverage as of December 31, 2020



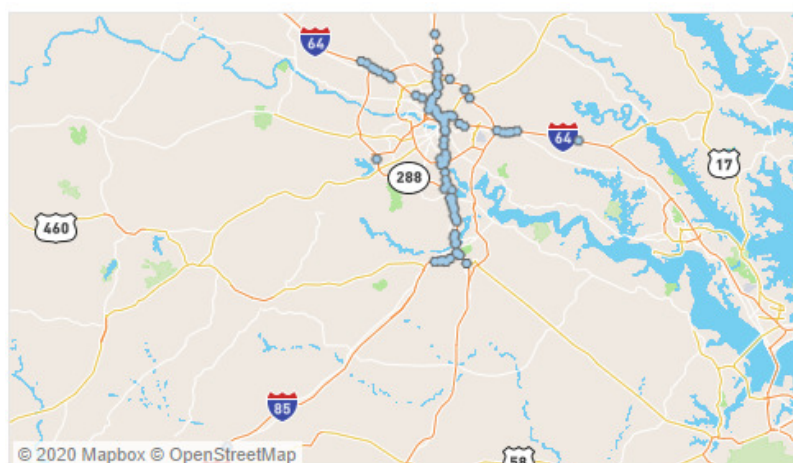
SSP Coverage Legend (Hours Per Day/Days Per Week)

14/5 14/5 & 16/2 16/7 24/7 No SSP

Interstates	Miles Covered	% Miles Covered	Mile-Hours Covered / Week	% Mile-Hours / Week
I-64	32	46%	5,292	46%
I-85	0	0%	0	0%
I-95	40	62%	6,346	58%
I-295	15	28%	1,680	19%
Other	4	100%	448	67%
Grand Total	91	35%	13,766	32%

Camera Coverage

Cameras (CCTV) as of December 31, 2020

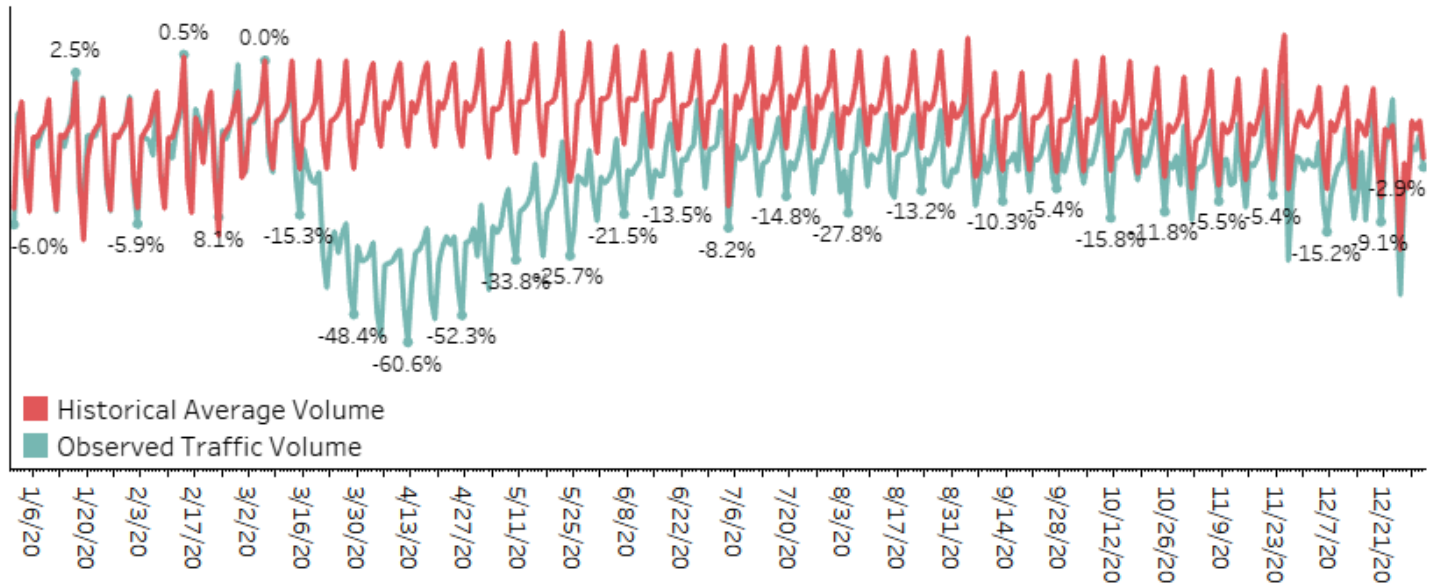


Interstate	Estimated Miles Covered by Cameras	Estimated % Miles Covered by CCTV
I-64	69	22%
I-85	69	10%
I-95	65	48%
I-195	4	33%
I-295	53	5%
Grand Total	260	22%

Coverage assumes that cameras can only see one side of the interstate unless it is in the median. 1 mile upstream and downstream is assumed to be covered by each camera.

COVID-19 Effects on Traffic

Changes in traffic volume in 2020

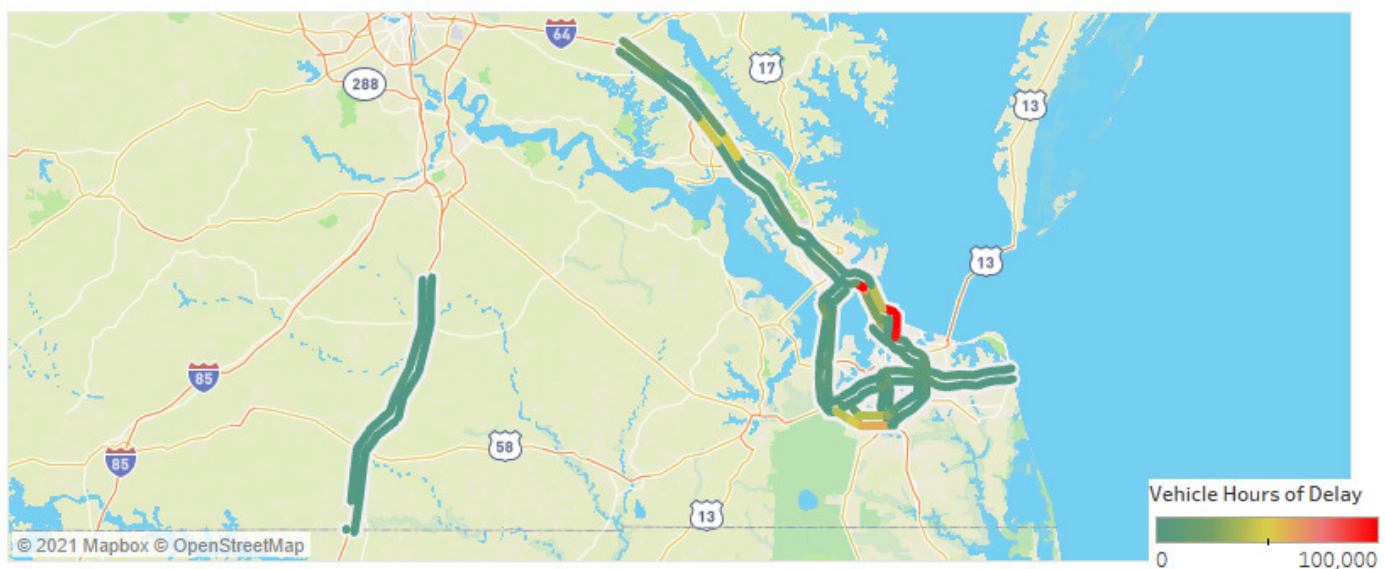


Hampton Roads District

This report compares performance of Interstate Highways from 2019 to 2020

Measure			Target	2019	2020
Total Vehicle Hours of Delay on Interstates The additional hours travelers waited in traffic that is moving 20 mph less than free-flow speed			↘	3,286K	1,554K
ALL INCIDENTS	All Roads	All Reported Incidents Number of disabled vehicle and crash incidents	N/A	Not Available*	
	Interstates	All Reported Incidents Number of disabled vehicle and crash incidents	N/A		
	Interstates	Scene Clearance Time Median time from verifying the incident to opening all lanes and shoulders	↘		
	Interstates	Potential Secondary Crash Incidents Estimated # of crash incidents which could be secondary to other incidents	↘	227	292
LANE IMPACTING INCIDENTS	All Roads	Lane Impacting Incidents # of disabled vehicle and crash incidents that block at least one travel lane	N/A	6,540	6,245
	Interstates	Lane Impacting Incidents # of disabled vehicle and crash incidents that block at least one travel lane	N/A	5,506	5,326
	Interstates	Roadway Clearance Time Median time from verifying the incident to opening all travel lanes to traffic	↘	19	22
	Interstates	Lane Impacting Incidents Cleared in < 30 minutes Percentage of Lane Impacting Incidents that are cleared in less than 30 min	59%	63%	58%
	Interstates	Lane Impacting Incidents Cleared in < 90 minutes Percentage of Lane Impacting Incidents that are cleared in less than 90 min	94%	95%	93%

Congestion in 2020

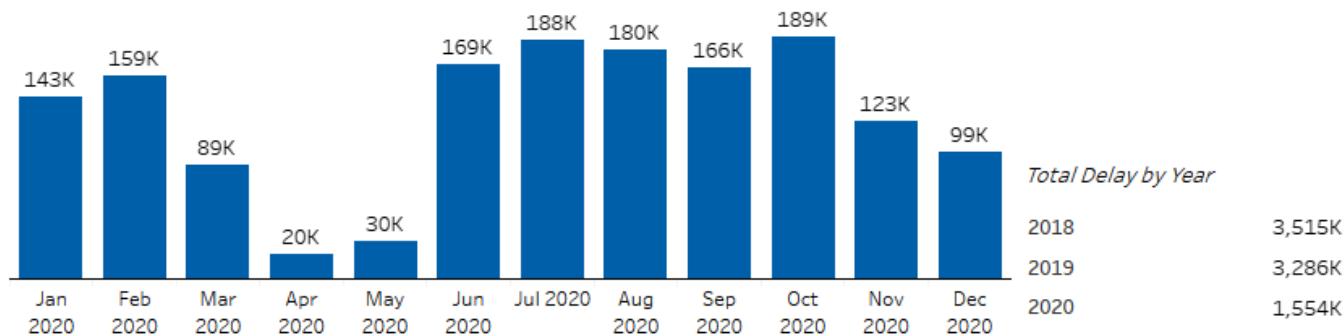


*At this time, data for all incidents is not available for Hampton Roads District. This will be resolved when Eastern Region Operations is tied into the Statewide ATMS. Potential Secondary Incidents are still being reported, but this is likely an underestimate of the true total due to not having all incidents.

Congestion Overview

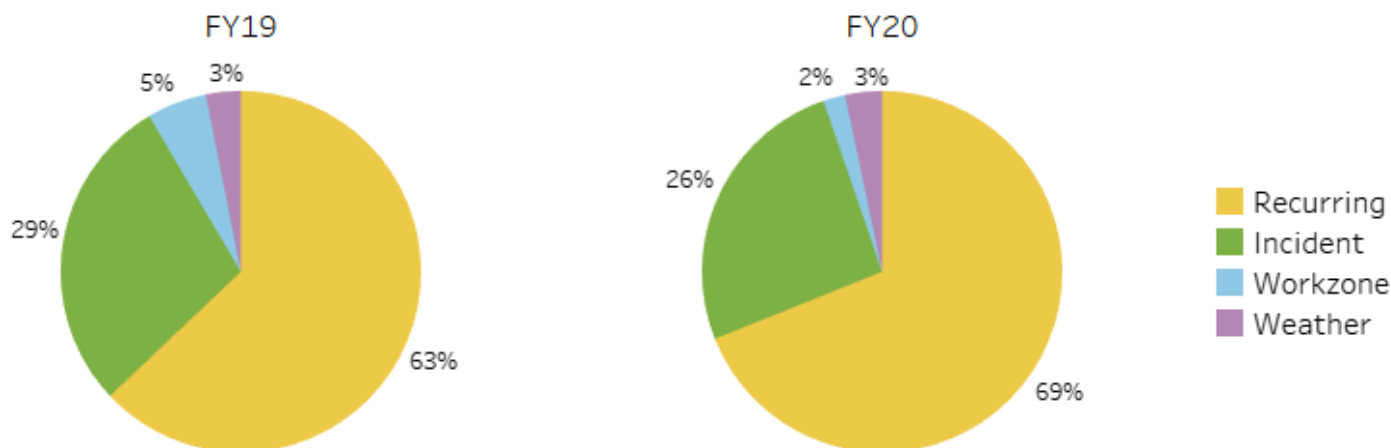
Vehicle Hours of Delay

Total Delay is calculated using INRIX probe speed data and historical VDOT volumes. Delay is calculated when the observed speed is 20 mph or more below free flow conditions.

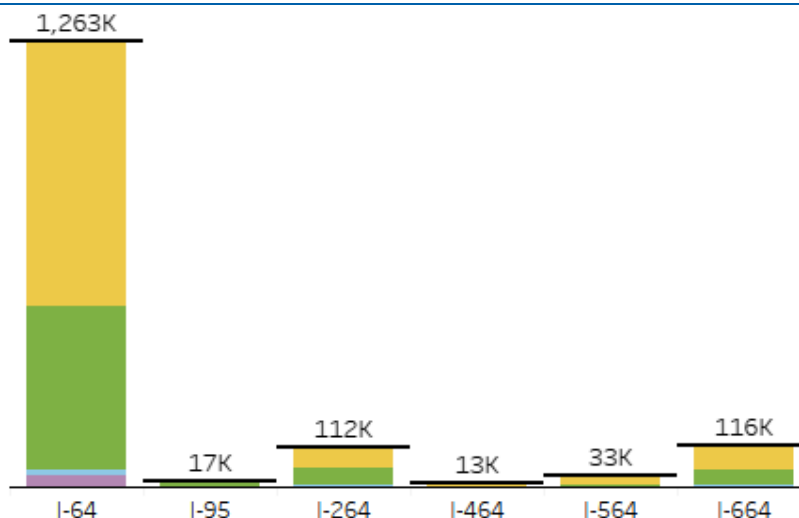


Causes of Congestion

Congestion can be broken down into recurring and non-recurring sources. Recurring congestion is caused by bottlenecks due to high volume or geometric constraints. Sources of non-recurring congestion on interstates include incidents, work zones, and weather events. The amount of congestion due to each of these sources can be estimated at a planning level as shown below.



Delay by Cause & Interstate in 2020



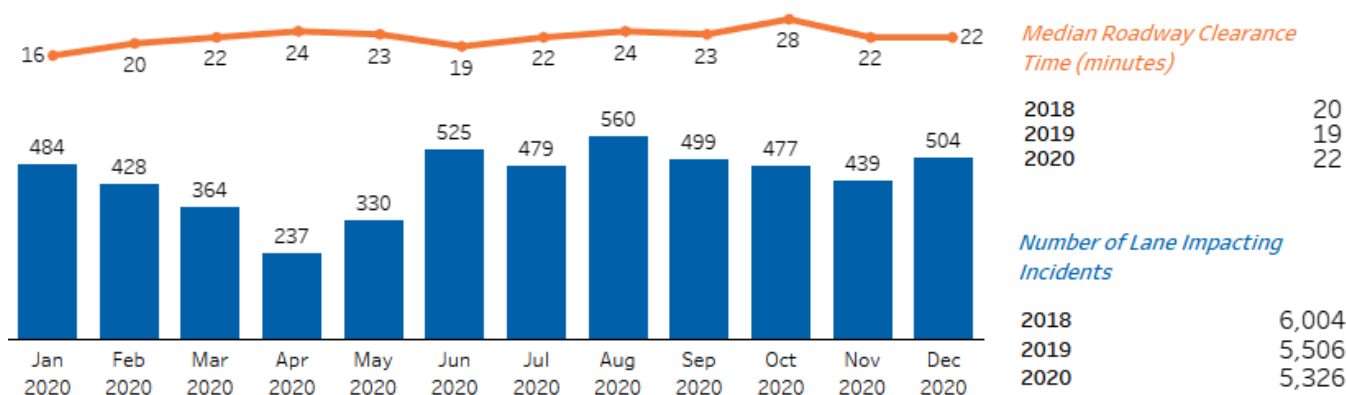


Incidents

Traffic incidents includes both crashes and disabled vehicles and are a frequent cause of non-recurring congestion. Quick clearance programs such as Safety Service Patrols, incident management coordination, and after-action review with the Virginia State Police (VSP) and the other first responders can influence the effects of incidents on traffic.

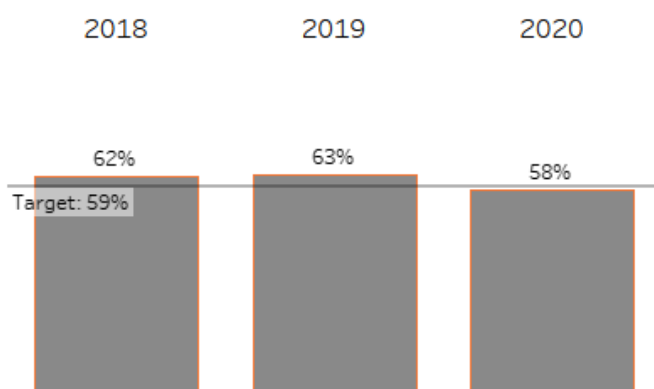
Lane Impacting Incidents & Roadway Clearance Time

Roadway Clearance Time (RCT) is measured for all disabled vehicle and crash incidents that block at least one travel lane during the course of the incident. RCT is measured from the start of the incident to when all travel lanes are clear and open to traffic.

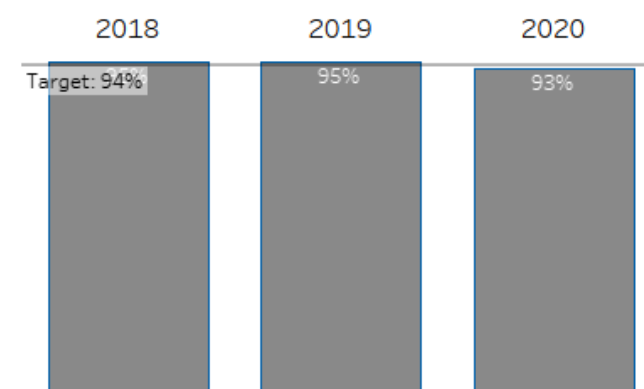


Lane Impacting Incidents by Roadway Clearance Time

Lane Impacting Incidents Cleared in <30 minutes

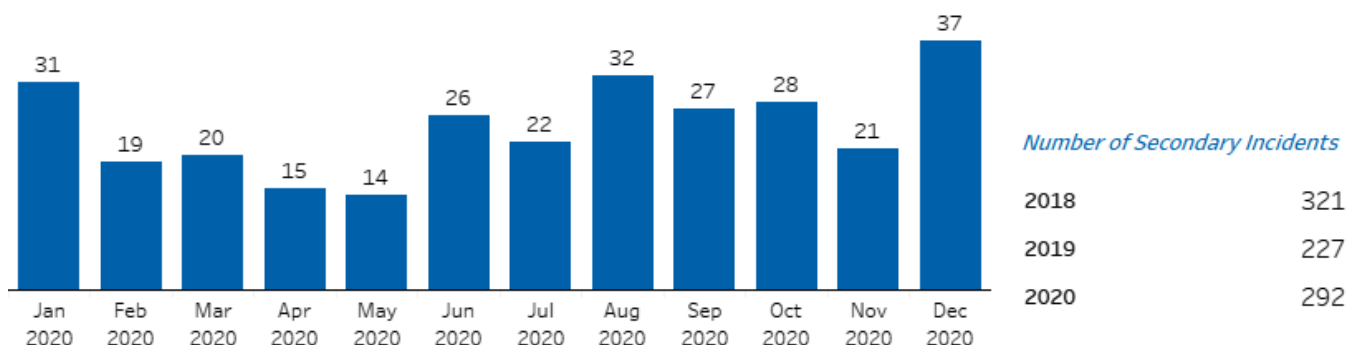


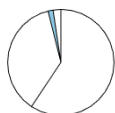
Lane Impacting Incidents Cleared in <90 minutes



Potential Secondary Incidents

The estimated number of crash incidents which could be secondary to other crash or disable vehicle incidents.





Work Zones

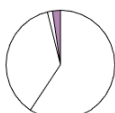
VDOT measures the number and types of work events and the impact on non-recurring congestion. The allowable work hours are regularly reviewed to promote safety and reduce congestion.

Work Zones by Interstate

Work zone event data from VaTraffic

	Number of Lane Impacting Work Zones		Mile - Hours of Lane Impacting Work Zones	
	2019	2020	2019	2020
I-64	729	637	23,092	13,966
I-66	59	176	689	2,477
I-95	324	105	24,769	2,972
I-264	233	271	2,630	3,140
I-464	8	31	120	144
I-564	29	29	226	342
Grand Total	1,382	1,249	51,525	23,041

Work event types include: new roadway construction; road widening; resurfacing; paving; bridge replacement; bridge joint, approach, deck, and superstructure repairs; bridge inspections; pavement marking installation; ITS equipment repair and installation; tunnel cleaning; and overhead sign structure repairs. Long-term work zones (>7 days) were not included.



Weather

VDOT measures the number and types of weather events and the impact on non-recurring congestion. The data helps identify emerging maintenance trends.

Short Term Weather Events

Number of weather events/incidents

Type	2019	2020
Fog	54	163
High Wind	49	58
Icy Conditions		3
Standing Water (Ponding)	16	20
Other	17	33

Long Term Weather Events (Road Condition)

Mile-Hours of Interstate reported in condition other than "open"

Weather Event	Road Condition	2020
Snow/Ice	Minor	751.9



Operations Assets

Cameras, Signs, and Safety Service Patrols are among the tools used to manage and minimize traffic congestion due to both recurring and non-recurring causes. VDOT measures the coverage areas and condition of these assets that help monitor traffic and improve mobility.

ITS Assets Availability - ERO, 2020

Device Type	Number of Devices	% of Time Devices were Online
CCTV	293	90.6%
CCTV Portable	1	100.0%
CMS	201	98.3%
CMS Portable	6	100.0%

Safety Service Patrol Coverage

Coverage as of December 31, 2020



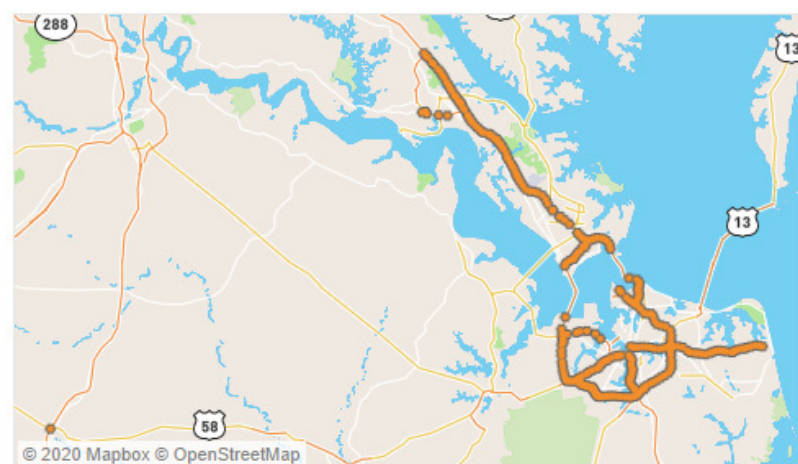
SSP Coverage Legend (Hours Per Day/Days Per Week)

16/7 24/7 No SSP

Interstate	Miles Covered	% Miles Covered	Mile-Hours Covered / Week	% Mile-Hours / Week
I-64	79	100%	13,272	100%
I-95	0	0%	0	0%
I-264	22	88%	4,200	100%
I-464	6	100%	1,008	100%
I-564	3	100%	504	100%
I-664	21	100%	3,528	100%
Grand T..	131	78%	22,512	80%

Camera Coverage

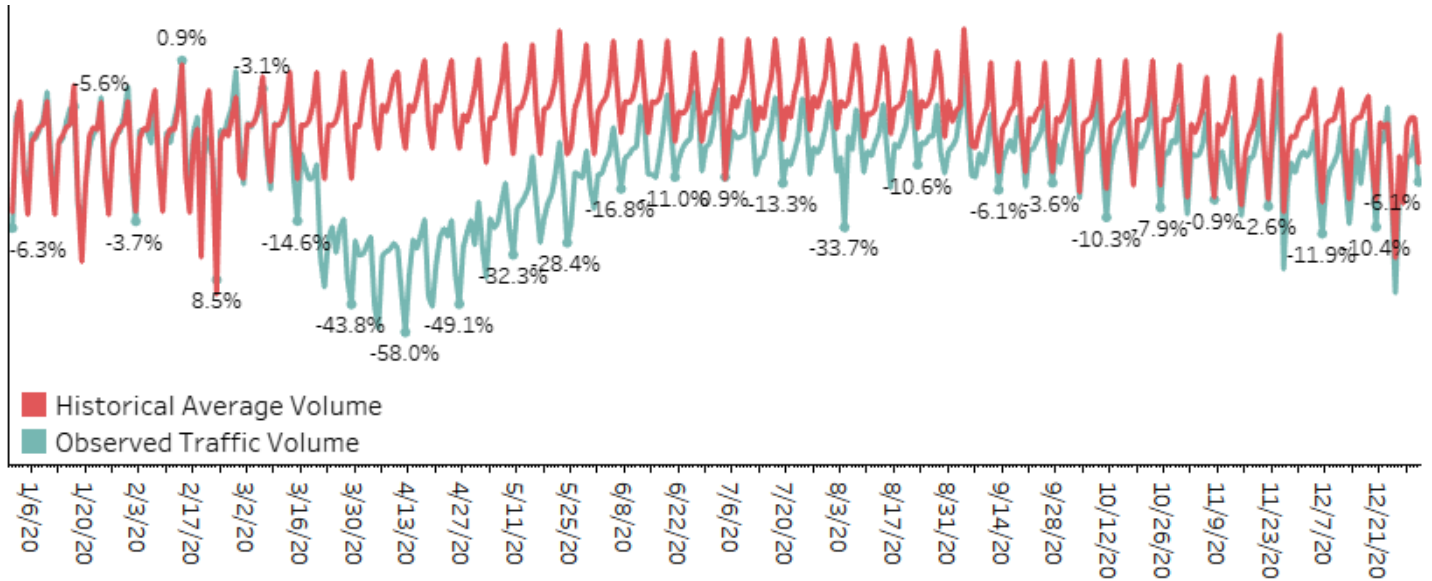
Cameras (CCTV) as of December 31, 2020



Interstate	Estimated Miles Covered by Cameras	Estimated % Miles Covered by CCTV
I-64	79	71%
I-95	33	3%
I-264	25	90%
I-464	6	84%
I-564	3	73%
I-664	21	60%
Grand Total	167	59%

COVID-19 Effects on Traffic

Changes in traffic volume in 2020

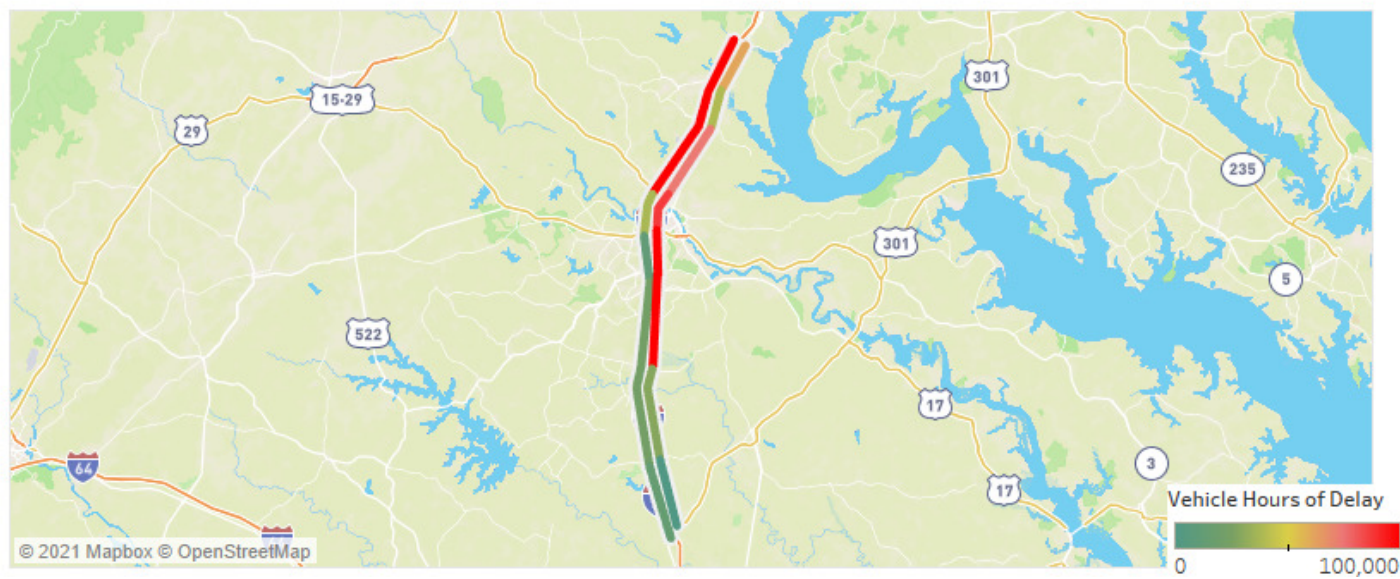


Fredericksburg District

This report compares performance of Interstate Highways from 2019 to 2020

Measure			Target	2019	2020
Total Vehicle Hours of Delay on Interstates The additional hours travelers waited in traffic that is moving 20 mph less than free-flow speed			↘	2,723K	1,383K
ALL INCIDENTS	All Roads	All Reported Incidents Number of disabled vehicle and crash incidents	N/A	10,373	7,170
	Interstates	All Reported Incidents Number of disabled vehicle and crash incidents	N/A	8,500	5,605
		Scene Clearance Time Median time from verifying the incident to opening all lanes and shoulders	↘	22	22
		Potential Secondary Crash Incidents Estimated # of crash incidents which could be secondary to other incidents	↘	208	117
LANE IMPACTING INCIDENTS	All Roads	Lane Impacting Incidents # of disabled vehicle and crash incidents that block at least one travel lane	N/A	1,779	1,598
	Interstates	Lane Impacting Incidents # of disabled vehicle and crash incidents that block at least one travel lane	N/A	769	727
		Roadway Clearance Time Median time from verifying the incident to opening all travel lanes to traffic	↘	36	44
		Lane Impacting Incidents Cleared in < 30 minutes Percentage of Lane Impacting Incidents that are cleared in less than 30 min	45%	43%	35%
		Lane Impacting Incidents Cleared in < 90 minutes Percentage of Lane Impacting Incidents that are cleared in less than 90 min	86%	88%	85%

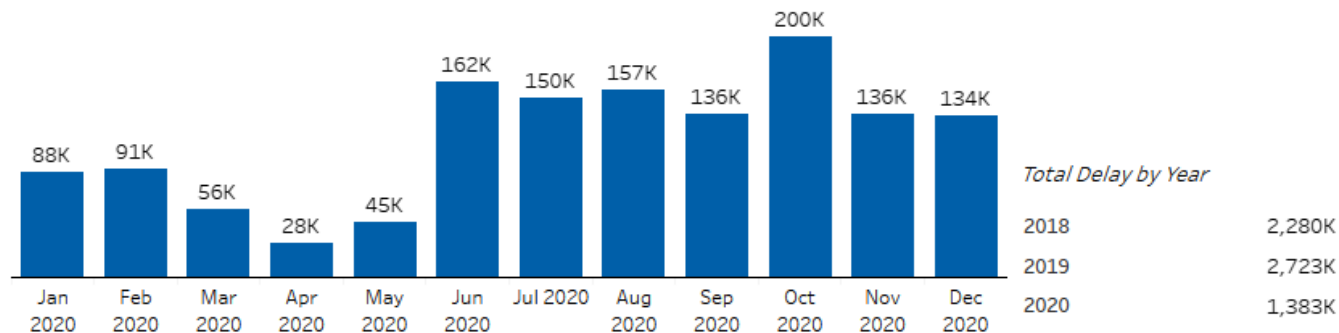
Congestion in 2020



Congestion Overview

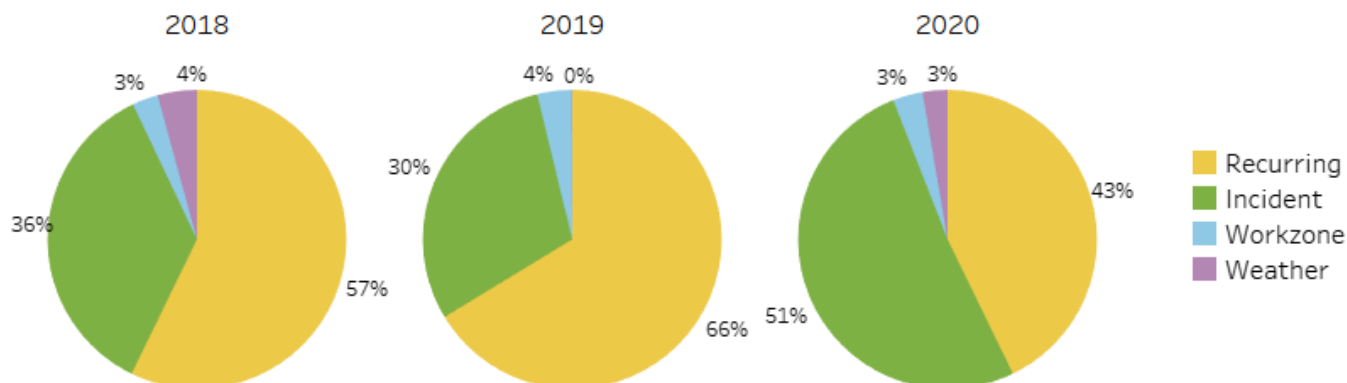
Vehicle Hours of Delay

Total Delay is calculated using INRIX probe speed data and historical VDOT volumes. Delay is calculated when the observed speed is 20 mph or more below free flow conditions.



Causes of Congestion

Congestion can be broken down into recurring and non-recurring sources. Recurring congestion is caused by bottlenecks due to high volume or geometric constraints. Sources of non-recurring congestion on interstates include incidents, work zones, and weather events. The amount of congestion due to each of these sources can be estimated at a planning level as shown below.



Delay by Cause & Interstate in 2020



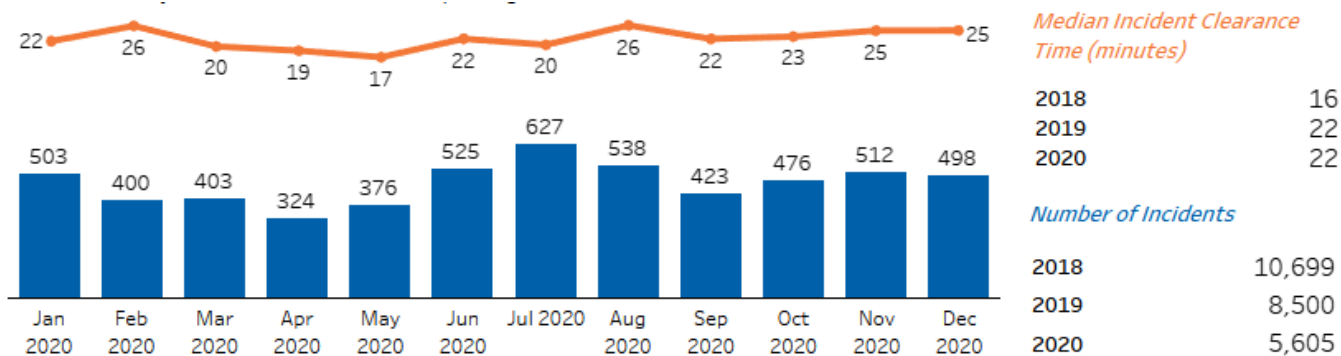


Incidents

Traffic incidents includes both crashes and disabled vehicles and are a frequent cause of non-recurring congestion. Quick clearance programs such as Safety Service Patrols, incident management coordination, and after-action review with the Virginia State Police (VSP) and the other first responders can influence the effects of incidents on traffic.

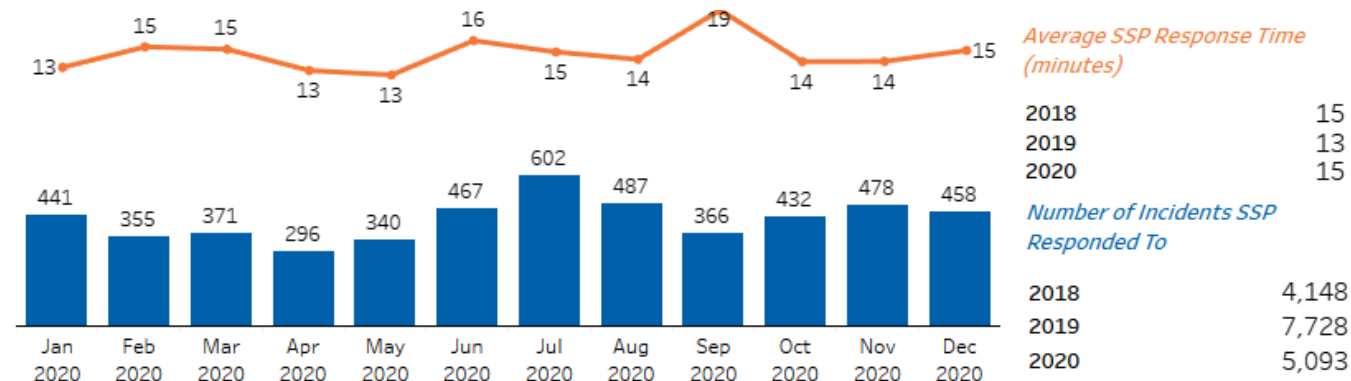
Total Incidents & Incident Clearance Time

Incident Clearance Time (also called Scene Clearance Time) is measures for all crash and disabled vehicle incidents on travel lanes and shoulders. Median Incident Clearance Time is shorter than Median Roadway Clearance Time because it is measures for all incidents, not just those which are lane impacting. A simple incident on a shoulder, such as a vehicle with a flat tire, is often quick to clear.

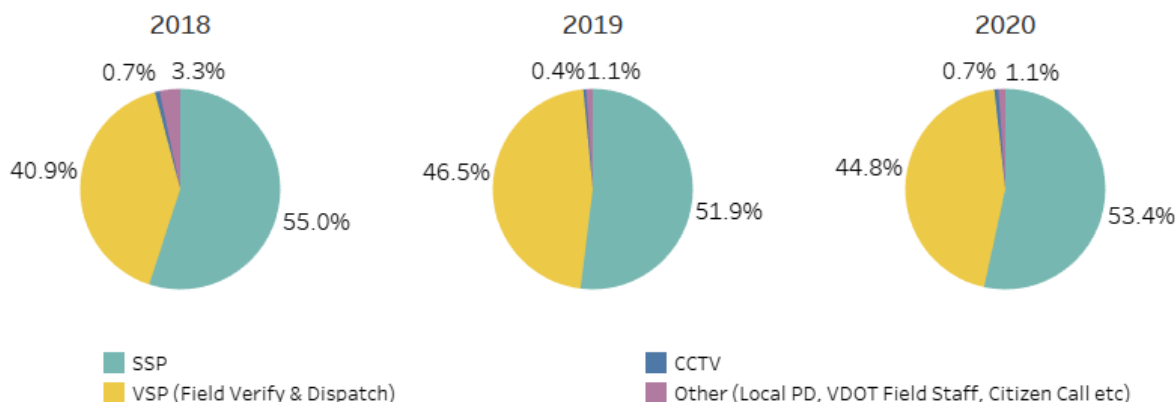


Safety Service Patrol Incident Responses & Response Time

Safety Service Patrol (SSP) Response Time is measured in minutes from the time the SSP Operator was notified to the time they arrived on Scene. This is measured for all disabled vehicle and crash incidents, which an SSP responded to. (Average Response Time between 2 and 60 minutes is measured)

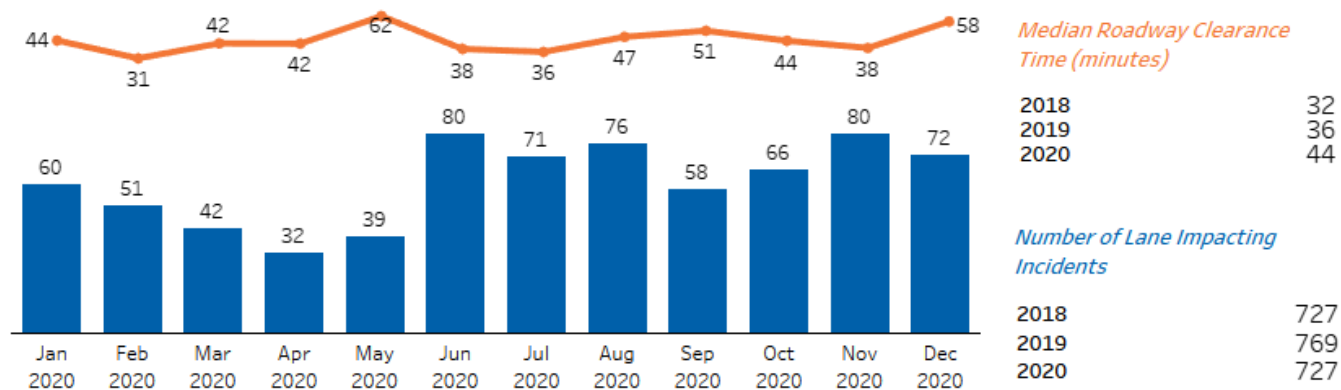


All Incidents by Detection Source



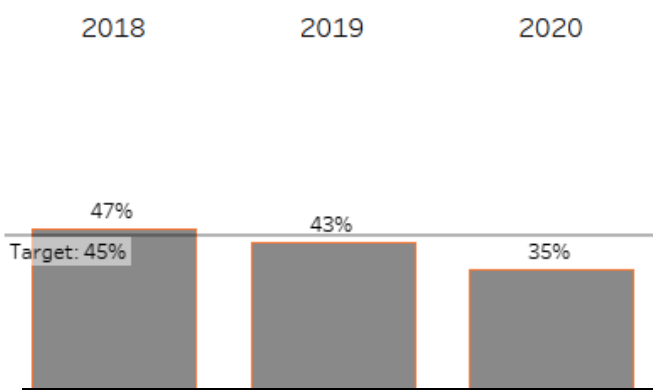
Lane Impacting Incidents & Roadway Clearance Time

Roadway Clearance Time (RCT) is measured for all disabled vehicle and crash incidents that block at least one travel lane during the course of the incident. RCT is measured from the start of the incident to when all travel lanes are clear and open to traffic.

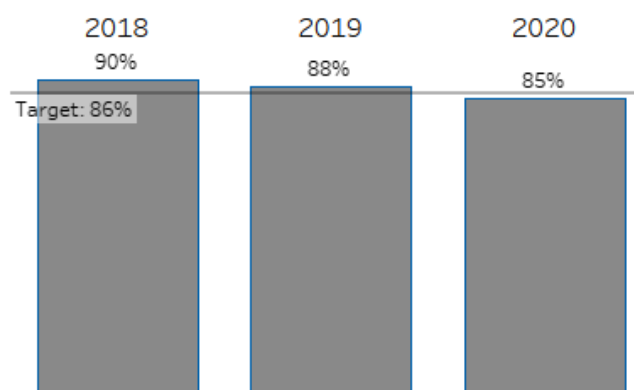


Lane Impacting Incidents by Roadway Clearance Time

Lane Impacting Incidents Cleared in <30 minutes

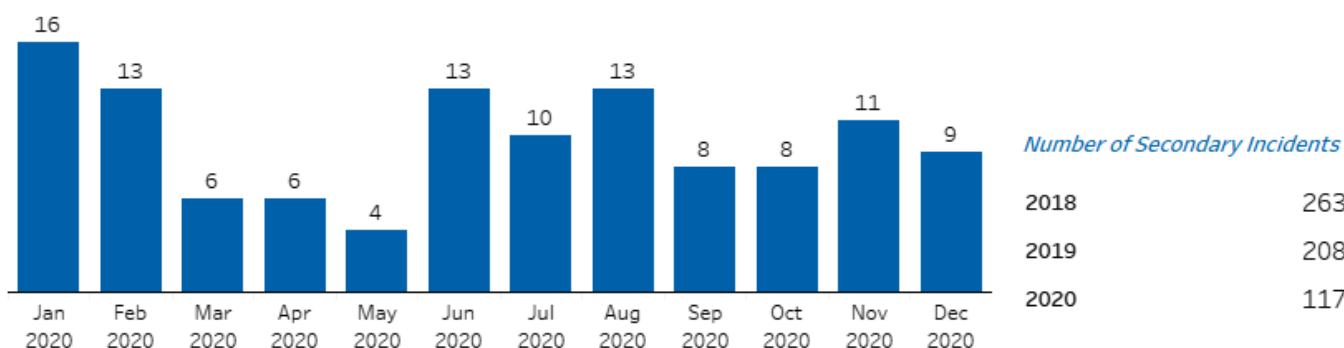


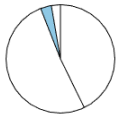
Lane Impacting Incidents Cleared in <90 minutes



Potential Secondary Incidents

The estimated number of crash incidents which could be secondary to other crash or disable vehicle incidents.





Work Zones

VDOT measures the number and types of work events and the impact on non-recurring congestion. The allowable work hours are regularly reviewed to promote safety and reduce congestion.

Work Zones by Interstate

Work zone event data from VaTraffic

	Number of Lane Impacting Work Zones		Mile - Hours of Lane Impacting Work Zones	
	2019	2020	2019	2020
I-95	416	571	6,606	12,922
Grand Total	416	571	6,606	12,922

Work event types include: new roadway construction; road widening; resurfacing; paving; bridge replacement; bridge joint, approach, deck, and superstructure repairs; bridge inspections; pavement marking installation; ITS equipment repair and installation; tunnel cleaning; and overhead sign structure repairs. Long-term work zones (>7 days) were not included.



Weather

VDOT measures the number and types of weather events and the impact on non-recurring congestion. The data helps identify emerging maintenance trends.

Short Term Weather Events

Number of weather events/incidents

Type	2019	2020
Fog		1
Icy Conditions	2	1
Standing Water (Ponding)	2	2
Other	10	11

Long Term Weather Events (Road Condition)

Mile-Hours of Interstate reported in condition other than "open"

Weather Event	Road Condition	2019	2020
	Minor	3,000	0
Snow/Ice	Moderate	1,121	
	Severe		73



Operations Assets

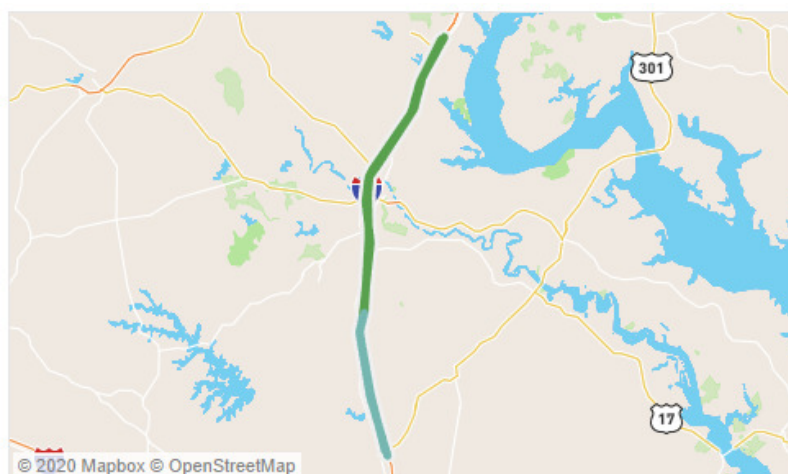
Cameras, Signs, and Safety Service Patrols are among the tools used to manage and minimize traffic congestion due to both recurring and non-recurring causes. VDOT measures the coverage areas and condition of these assets that help monitor traffic and improve mobility.

ITS Assets Availability - CRO, 2020

Device Type	Number of Devices	% of Time Devices were Online
CCTV	87	96.9%
CCTV Portable	1	95.3%
CMS	15	92.8%
CMS Portable	19	97.6%

Safety Service Patrol Coverage

Coverage as of December 31, 2020



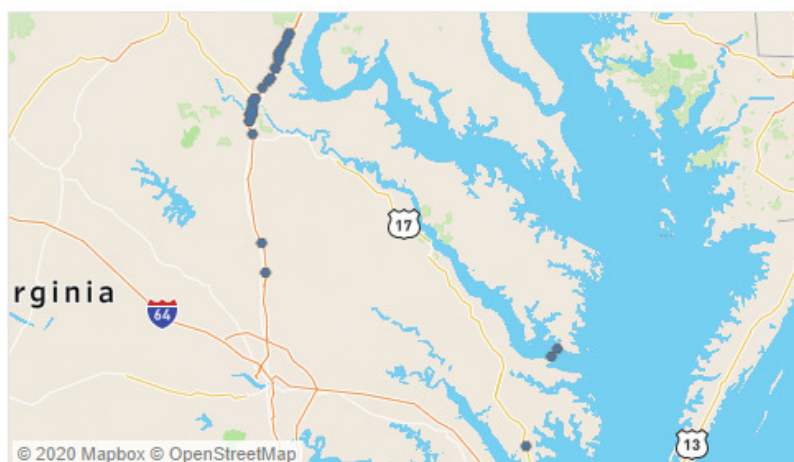
SSP Coverage Legend (Hours Per Day/Days Per Week)

16/7 24/7

Interstate	Miles Covered	% Miles Covered	Mile-Hours Covered / Week	% Mile-Hours / Week
I-95	50	100%	7,280	87%
Grand Total	50	100%	7,280	87%

Camera Coverage

Cameras (CCTV) as of December 31, 2020

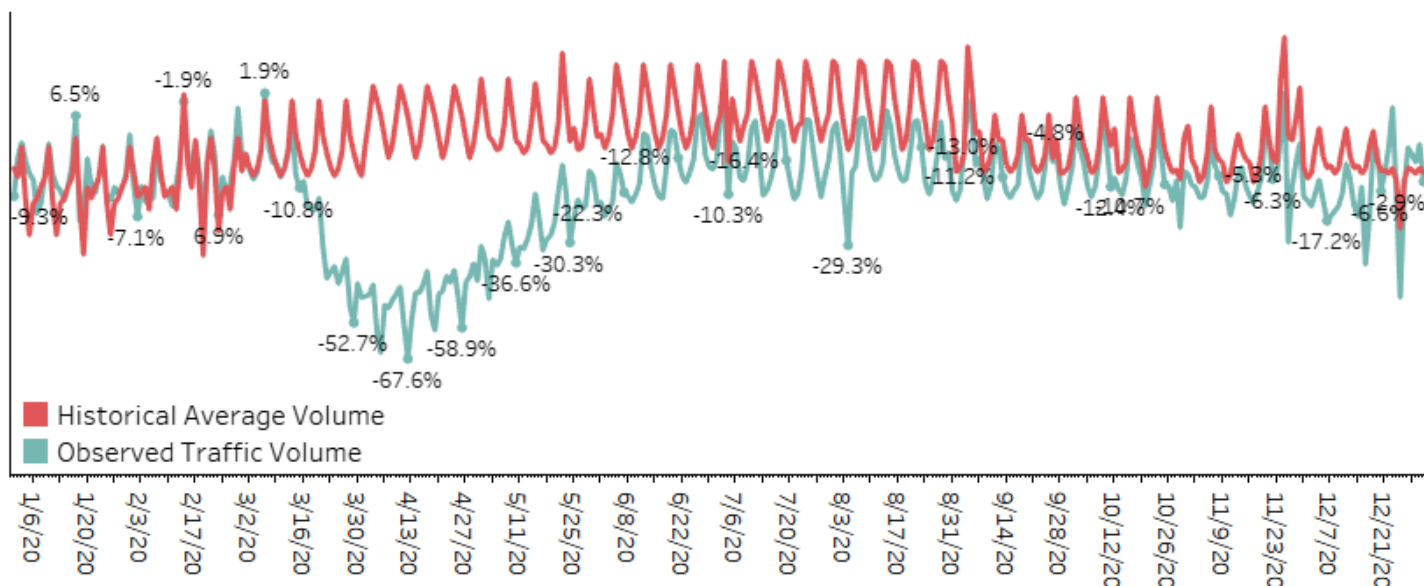


Interstate	Estimated Miles Covered by Cameras	Estimated % Miles Covered by CCTV
I-95	50	38%
Grand Total	50	38%

Coverage assumes that cameras can only see one side of the interstate unless it is in the median.
1 mile upstream and downstream is assumed to be covered by each camera.

COVID-19 Effects on Traffic

Changes in traffic volume in 2020

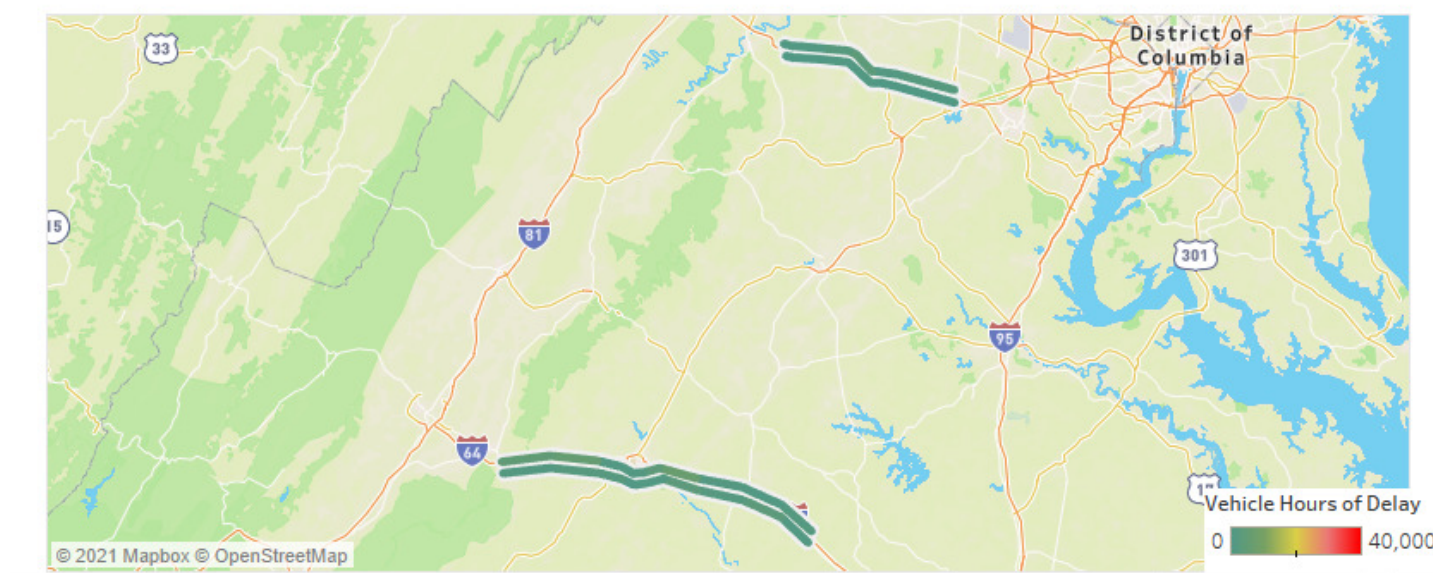


Culpeper District

This report compares performance of Interstate Highways from 2019 to 2020

Measure			Target	2019	2020
Total Vehicle Hours of Delay on Interstates The additional hours travelers waited in traffic that is moving 20 mph less than free-flow speed			↘	171K	47K
ALL INCIDENTS	All Roads	All Reported Incidents Number of disabled vehicle and crash incidents	N/A	4,305	4,360
	Interstates	All Reported Incidents Number of disabled vehicle and crash incidents	N/A	2,975	3,099
		Scene Clearance Time Median time from verifying the incident to opening all lanes and shoulders	↘	15	10
		Potential Secondary Crash Incidents Estimated # of crash incidents which could be secondary to other incidents	↘	45	20
LANE IMPACTING INCIDENTS	All Roads	Lane Impacting Incidents # of disabled vehicle and crash incidents that block at least one travel lane	N/A	1,404	1,350
	Interstates	Lane Impacting Incidents # of disabled vehicle and crash incidents that block at least one travel lane	N/A	396	342
		Roadway Clearance Time Median time from verifying the incident to opening all travel lanes to traffic	↘	45	40
		Lane Impacting Incidents Cleared in < 30 minutes Percentage of Lane Impacting Incidents that are cleared in less than 30 min	31%	33%	37%
		Lane Impacting Incidents Cleared in < 90 minutes Percentage of Lane Impacting Incidents that are cleared in less than 90 min	87%	87%	92%

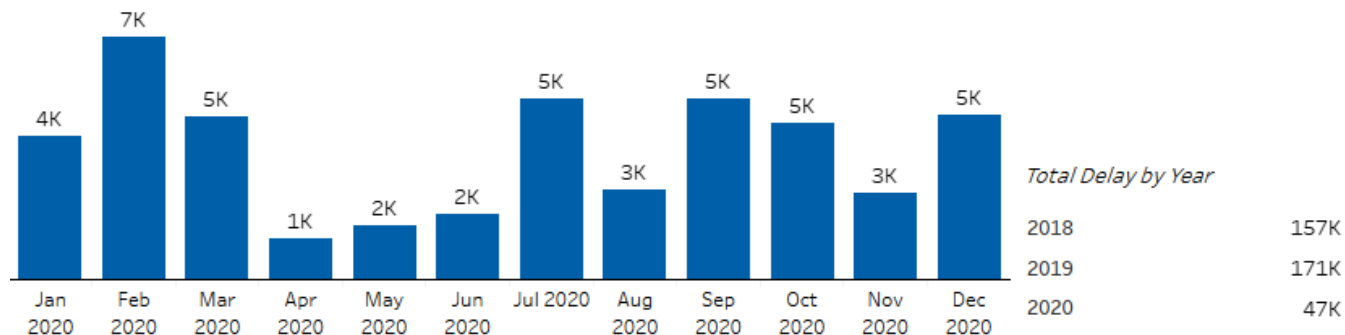
Congestion in 2020



Congestion Overview

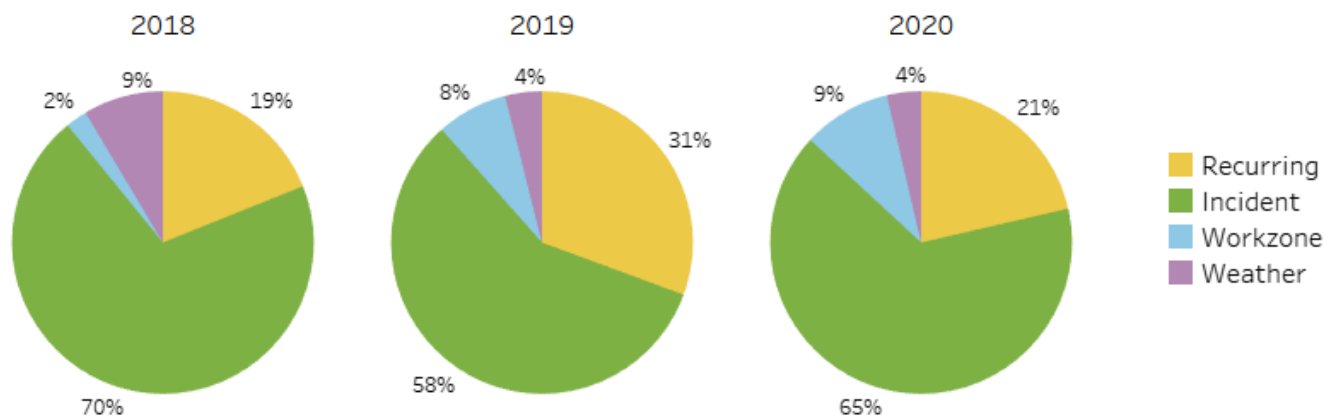
Vehicle Hours of Delay

Total Delay is calculated using INRIX probe speed data and historical VDOT volumes. Delay is calculated when the observed speed is 20 mph or more below free flow conditions.

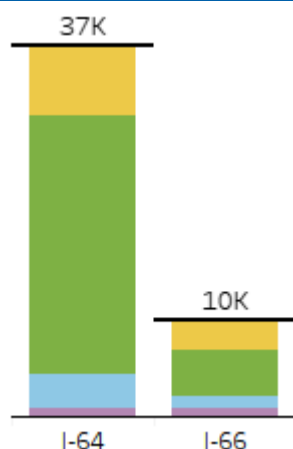


Causes of Congestion

Congestion can be broken down into recurring and non-recurring sources. Recurring congestion is caused by bottlenecks due to high volume or geometric constraints. Sources of non-recurring congestion on interstates include incidents, work zones, and weather events. The amount of congestion due to each of these sources can be estimated at a planning level as shown below.



Delay by Cause & Interstate in 2020



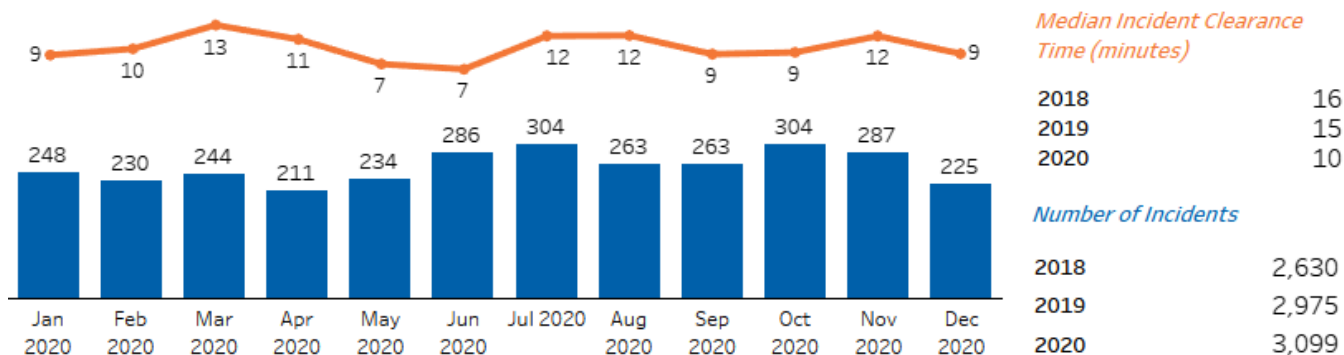


Incidents

Traffic incidents includes both crashes and disabled vehicles and are a frequent cause of non-recurring congestion. Quick clearance programs such as Safety Service Patrols, incident management coordination, and after-action review with the Virginia State Police (VSP) and the other first responders can influence the effects of incidents on traffic.

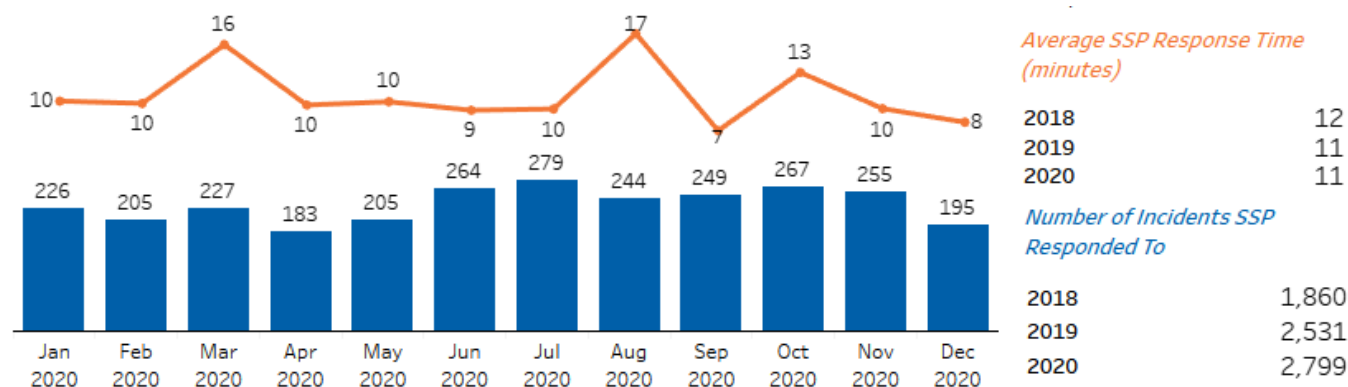
Total Incidents & Incident Clearance Time

Incident Clearance Time (also called Scene Clearance Time) is measures for all crash and disabled vehicle incidents on travel lanes and shoulders. Median Incident Clearance Time is shorter than Median Roadway Clearance Time because it is measures for all incidents, not just those which are lane impacting. A simple incident on a shoulder, such as a vehicle with a flat tire, is often quick to clear.

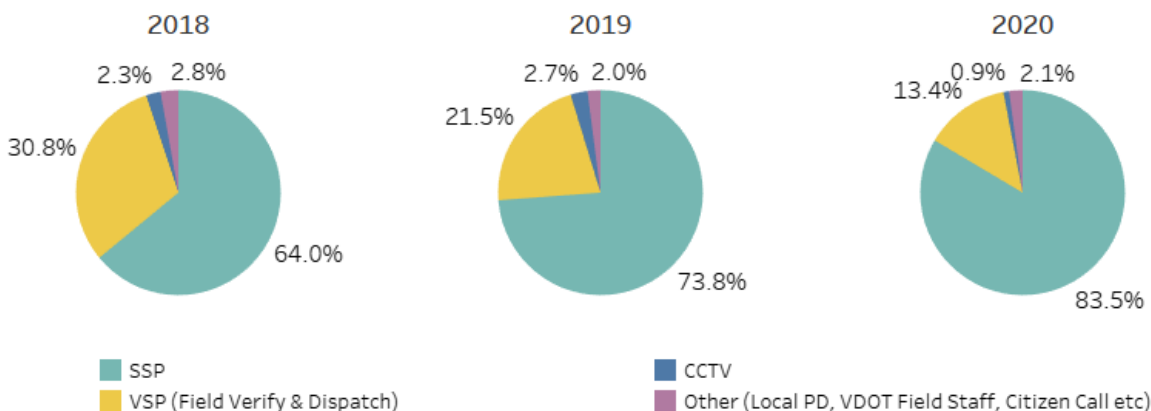


Safety Service Patrol Incident Responses & Response Time

Safety Service Patrol (SSP) Response Time is measured in minutes from the time the SSP Operator was notified to the time they arrived on Scene. This is measured for all disabled vehicle and crash incidents, which an SSP responded to. (Average Response Time between 2 and 60 minutes is measured)

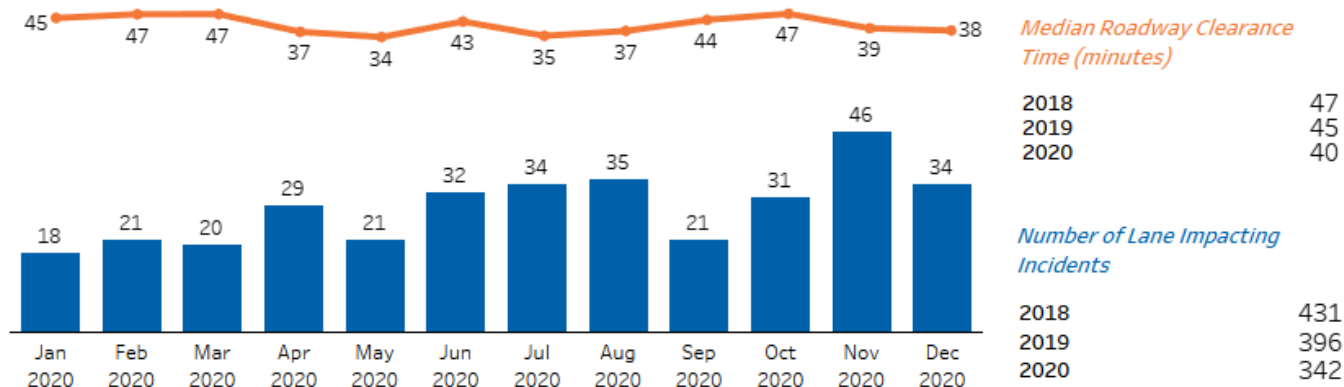


All Incidents by Detection Source



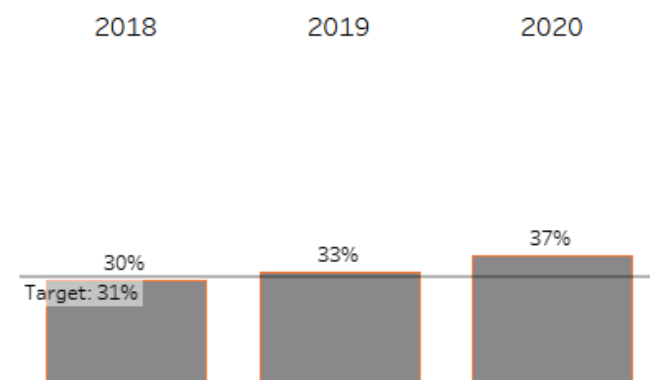
Lane Impacting Incidents & Roadway Clearance Time

Roadway Clearance Time (RCT) is measured for all disabled vehicle and crash incidents that block at least one travel lane during the course of the incident. RCT is measured from the start of the incident to when all travel lanes are clear and open to traffic.

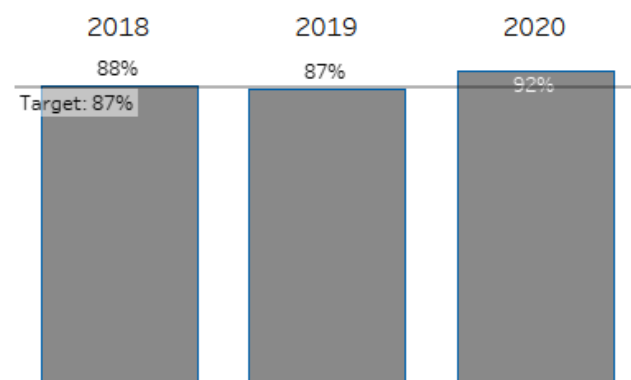


Lane Impacting Incidents by Roadway Clearance Time

Lane Impacting Incidents Cleared in <30 minutes

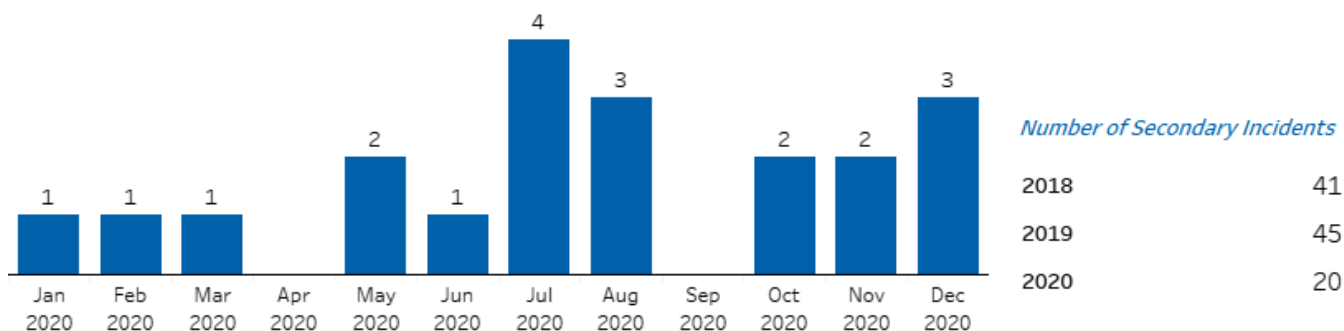


Lane Impacting Incidents Cleared in <90 minutes



Potential Secondary Incidents

The estimated number of crash incidents which could be secondary to other crash or disable vehicle incidents.





Work Zones

VDOT measures the number and types of work events and the impact on non-recurring congestion. The allowable work hours are regularly reviewed to promote safety and reduce congestion.

Work Zones by Interstate

Work zone event data from VaTraffic

	Number of Lane Impacting Work Zones		Mile - Hours of Lane Impacting Work Zones	
	2019	2020	2019	2020
I-64	109	104	3,005	3,818
I-66	62	133	1,119	5,681
Grand Total	171	237	4,125	9,499

Work event types include: new roadway construction; road widening; resurfacing; paving; bridge replacement; bridge joint, approach, deck, and superstructure repairs; bridge inspections; pavement marking installation; ITS equipment repair and installation; tunnel cleaning; and overhead sign structure repairs. Long-term work zones (>7 days) were not included.



Weather

VDOT measures the number and types of weather events and the impact on non-recurring congestion. The data helps identify emerging maintenance trends.

Short Term Weather Events

Number of weather events/incidents

Type	2019	2020
Fog		10
High Wind	4	34
Other		1

Long Term Weather Events (Road Condition)

Mile-Hours of Interstate reported in condition other than "open"

Weather Event	Road Condition	2019	2020
Snow/Ice	Minor	5,477	864
	Moderate	769	476



Operations Assets

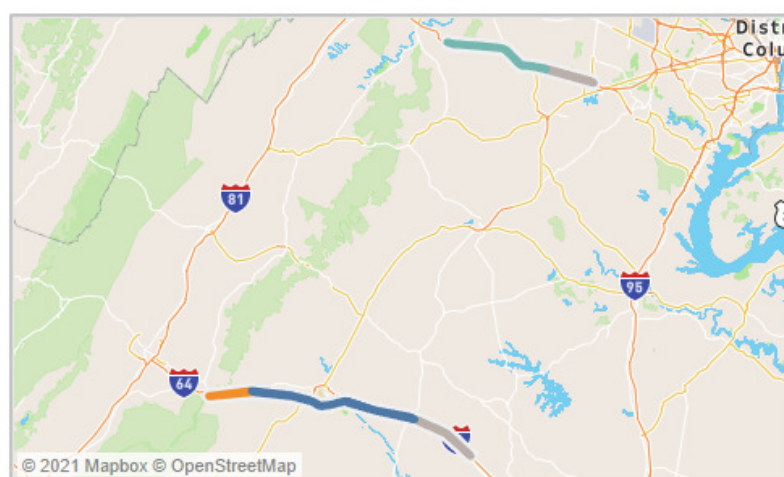
Cameras, Signs, and Safety Service Patrols are among the tools used to manage and minimize traffic congestion due to both recurring and non-recurring causes. VDOT measures the coverage areas and condition of these assets that help monitor traffic and improve mobility.

ITS Assets Availability - NWRO, 2020

Device Type	Number of Devices	% of Time Devices were Online
CCTV	124	92.8%
CCTV Portable	18	95.9%
CMS	32	87.8%
CMS Portable	38	68.5%

Safety Service Patrol Coverage

Coverage as of December 31, 2020



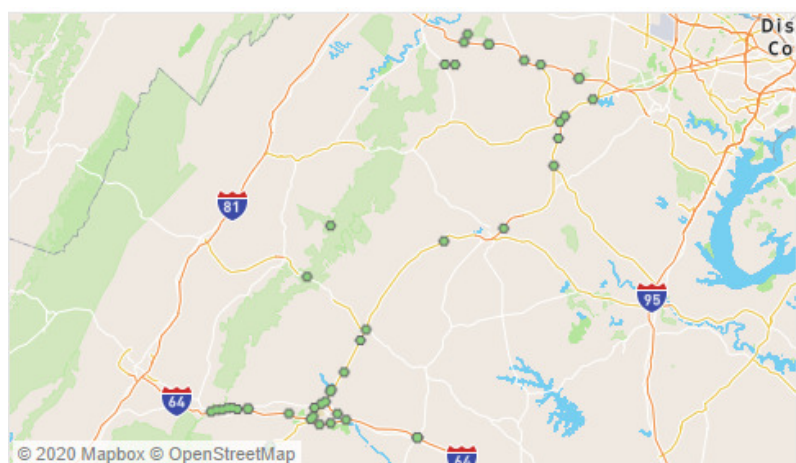
SSP Coverage Legend (Hours Per Day/Days Per Week)

12/5 12/7 16/7 No SSP

Interstate	Miles Covered	% Miles Covered	Mile-Hours Covered / Week	% Mile-Hours / Week
I-64	29	59%	2,412	29%
I-66	18	67%	2,016	44%
Grand Total	47	62%	4,428	35%

Camera Coverage

Cameras (CCTV) as of December 31, 2020

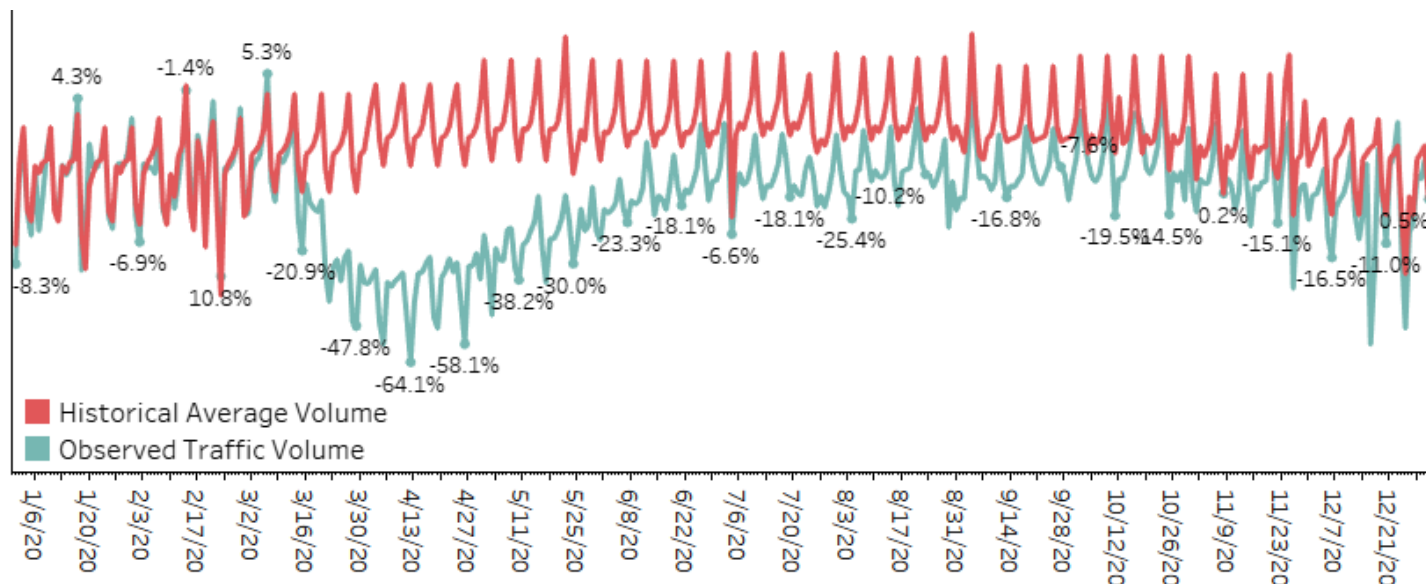


Interstate	Estimated Miles Covered by Cameras	Estimated % Miles Covered by CCTV
I-64	49	33%
I-66	27	22%
Grand Total	76	29%

Coverage assumes that cameras can only see one side of the interstate unless it is in the median.
1 mile upstream and downstream is assumed to be covered by each camera.





COVID-19 Effects on Traffic

Changes in traffic volume in 2020

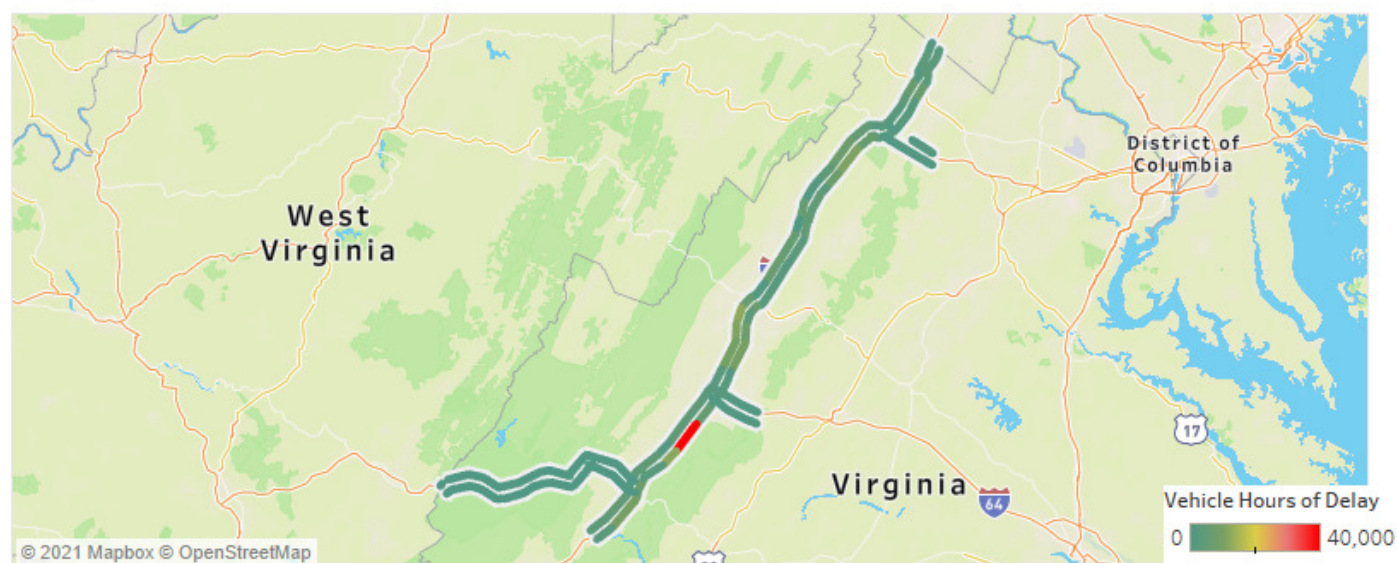


Staunton District

This report compares performance of Interstate Highways from 2019 to 2020

Measure			Target	2019	2020
Total Vehicle Hours of Delay on Interstates The additional hours travelers waited in traffic that is moving 20 mph less than free-flow speed				564K	333K
ALL INCIDENTS	All Roads	All Reported Incidents Number of disabled vehicle and crash incidents	N/A	11,300	10,910
	Interstates	All Reported Incidents Number of disabled vehicle and crash incidents	N/A	9,613	9,413
		Scene Clearance Time Median time from verifying the incident to opening all lanes and shoulders		14	12
		Potential Secondary Crash Incidents Estimated # of crash incidents which could be secondary to other incidents		131	112
LANE IMPACTING INCIDENTS	All Roads	Lane Impacting Incidents # of disabled vehicle and crash incidents that block at least one travel lane	N/A	2,207	2,156
	Interstates	Lane Impacting Incidents # of disabled vehicle and crash incidents that block at least one travel lane	N/A	1,054	1,035
		Roadway Clearance Time Median time from verifying the incident to opening all travel lanes to traffic		46	48
		Lane Impacting Incidents Cleared in < 30 minutes Percentage of Lane Impacting Incidents that are cleared in less than 30 min	30%	32%	30%
		Lane Impacting Incidents Cleared in < 90 minutes Percentage of Lane Impacting Incidents that are cleared in less than 90 min	81%	83%	81%

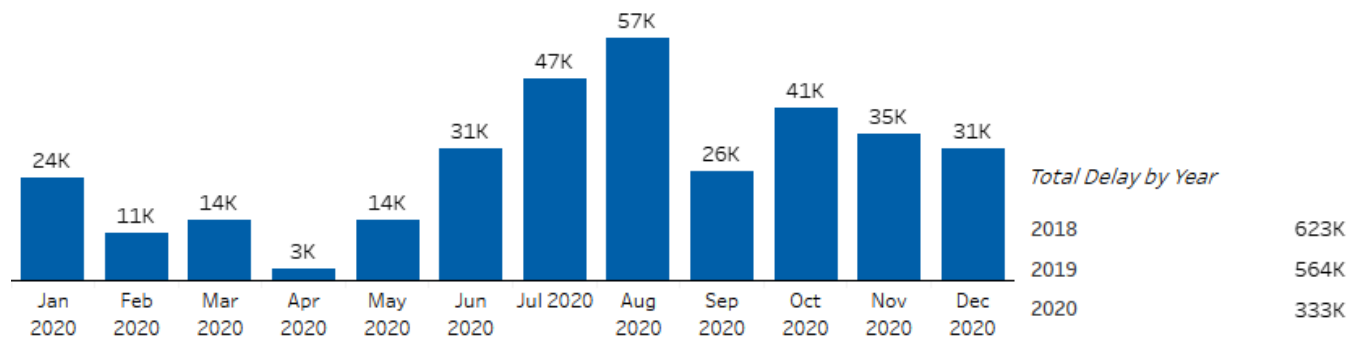
Congestion in 2020



Congestion Overview

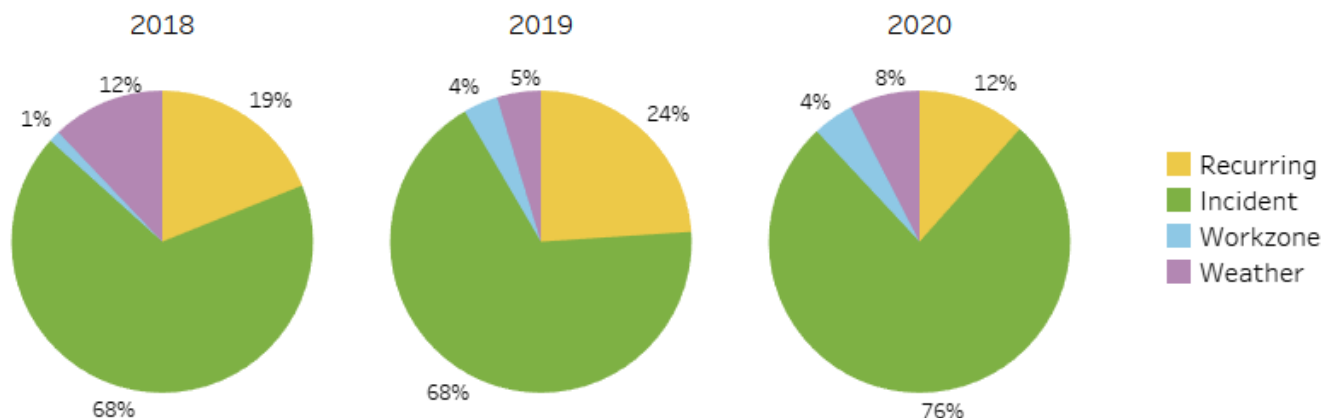
Vehicle Hours of Delay

Total Delay is calculated using INRIX probe speed data and historical VDOT volumes. Delay is calculated when the observed speed is 20 mph or more below free flow conditions.

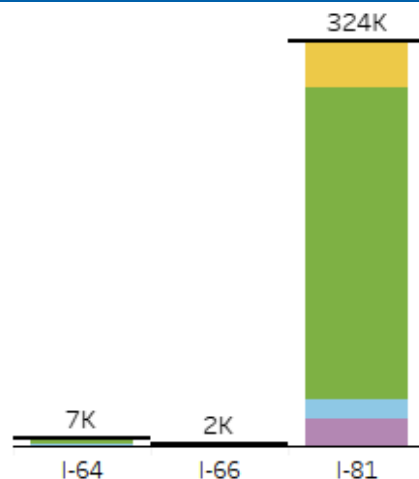


Causes of Congestion

Congestion can be broken down into recurring and non-recurring sources. Recurring congestion is caused by bottlenecks due to high volume or geometric constraints. Sources of non-recurring congestion on interstates include incidents, work zones, and weather events. The amount of congestion due to each of these sources can be estimated at a planning level as shown below.



Delay by Cause & Interstate in 2020



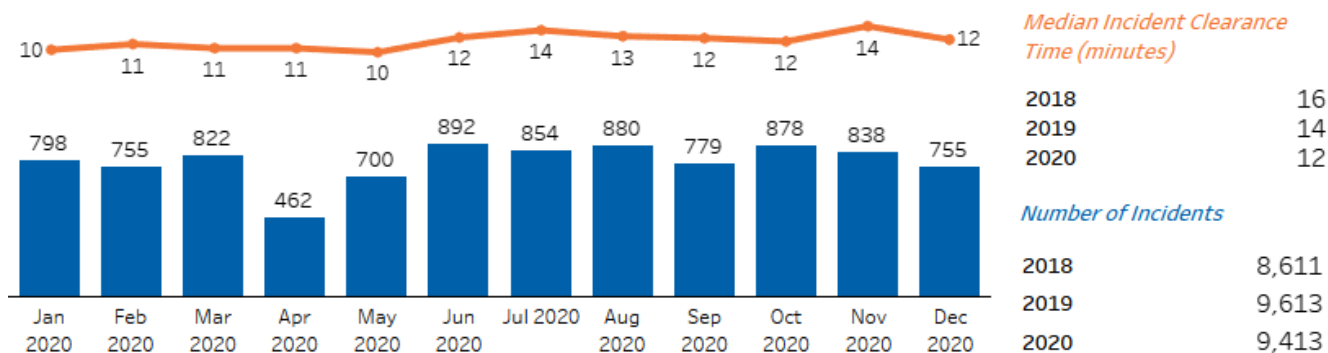


Incidents

Traffic incidents includes both crashes and disabled vehicles and are a frequent cause of non-recurring congestion. Quick clearance programs such as Safety Service Patrols, incident management coordination, and after-action review with the Virginia State Police (VSP) and the other first responders can influence the effects of incidents on traffic.

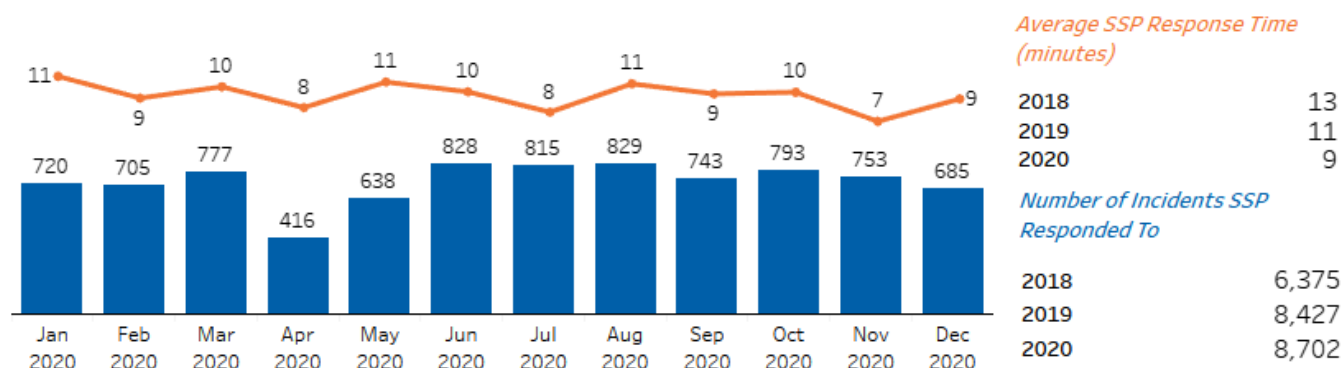
Total Incidents & Incident Clearance Time

Incident Clearance Time (also called Scene Clearance Time) is measures for all crash and disabled vehicle incidents on travel lanes and shoulders. Median Incident Clearance Time is shorter than Median Roadway Clearance Time because it is measures for all incidents, not just those which are lane impacting. A simple incident on a shoulder, such as a vehicle with a flat tire, is often quick to clear.

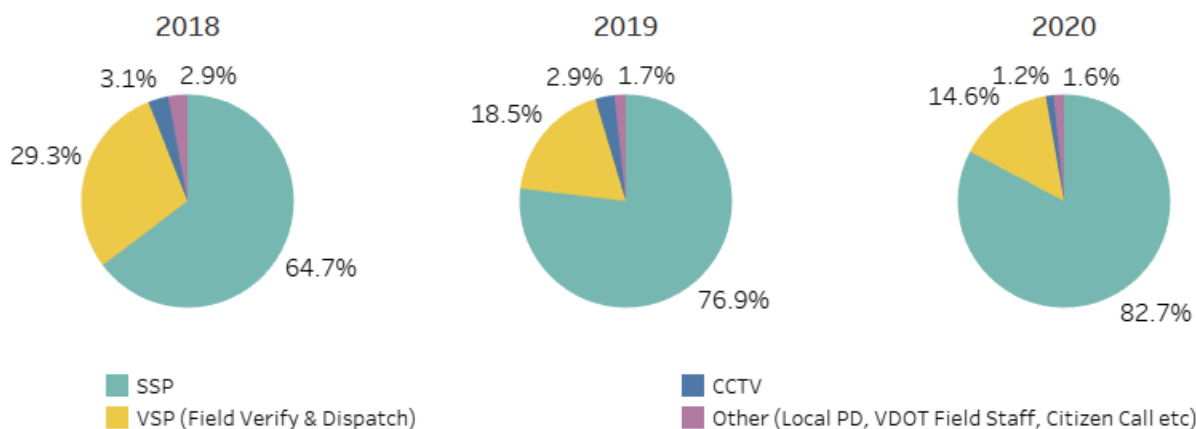


Safety Service Patrol Incident Responses & Response Time

Safety Service Patrol (SSP) Response Time is measured in minutes from the time the SSP Operator was notified to the time they arrived on Scene. This is measured for all disabled vehicle and crash incidents, which an SSP responded to. (Average Response Time between 2 and 60 minutes is measured)

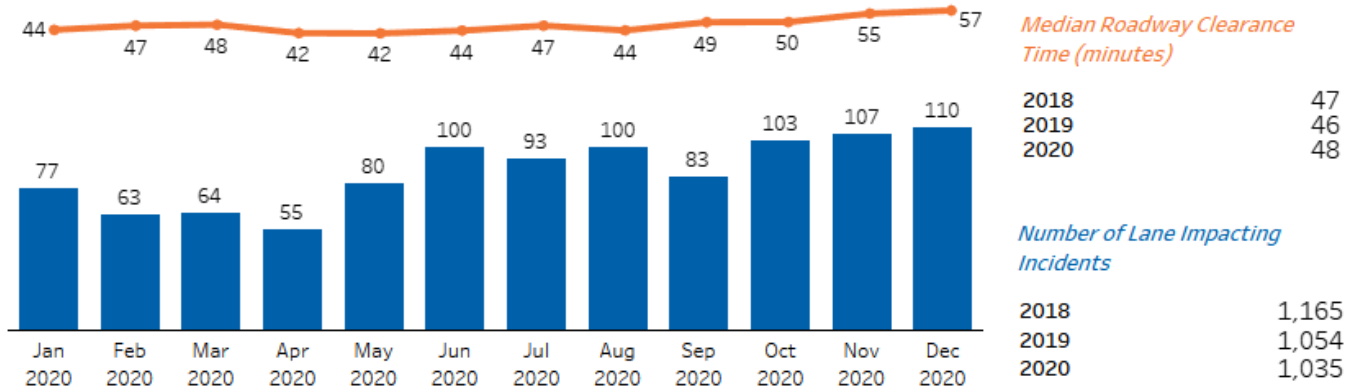


All Incidents by Detection Source

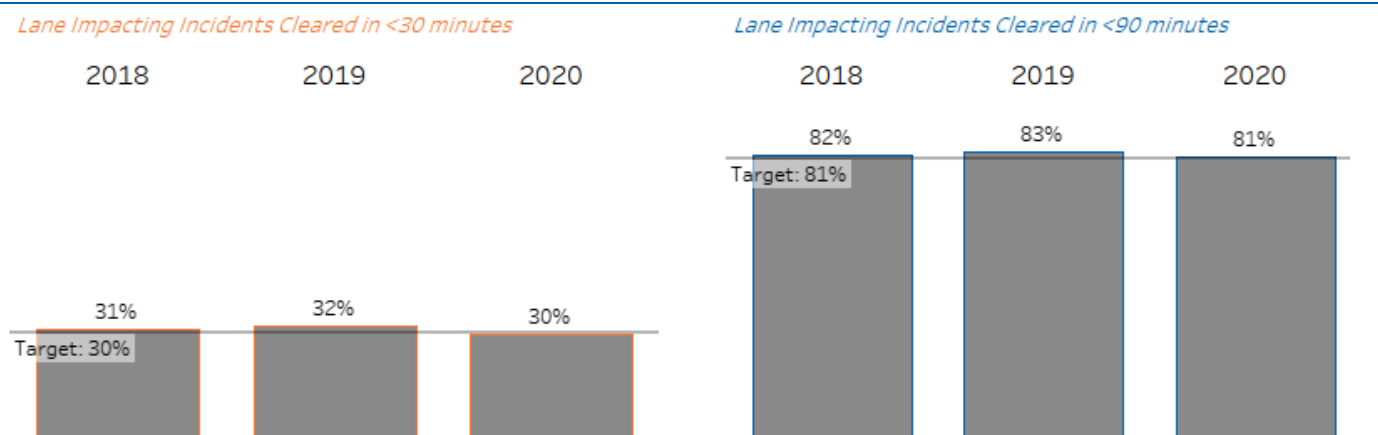


Lane Impacting Incidents & Roadway Clearance Time

Roadway Clearance Time (RCT) is measured for all disabled vehicle and crash incidents that block at least one travel lane during the course of the incident. RCT is measured from the start of the incident to when all travel lanes are clear and open to traffic.

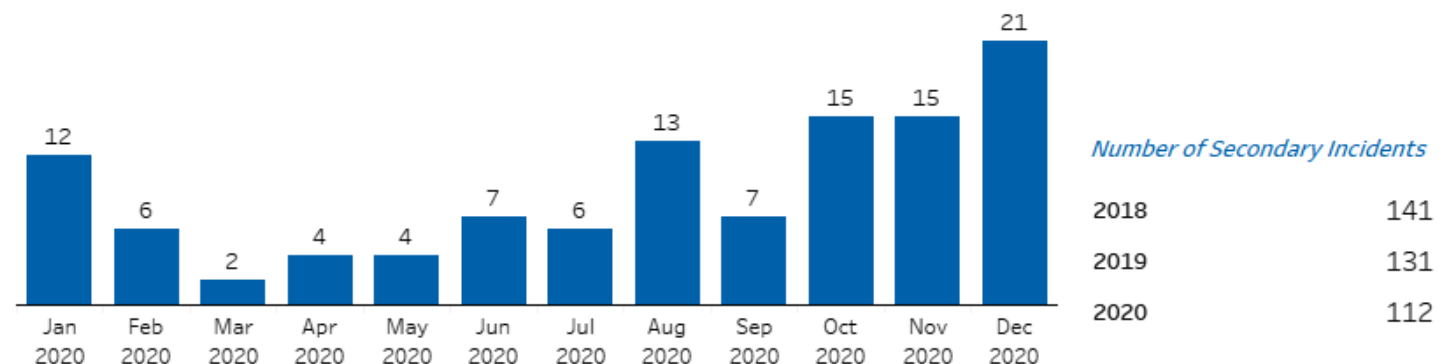


Lane Impacting Incidents by Roadway Clearance Time



Potential Secondary Incidents

The estimated number of crash incidents which could be secondary to other crash or disable vehicle incidents.





Work Zones

VDOT measures the number and types of work events and the impact on non-recurring congestion. The allowable work hours are regularly reviewed to promote safety and reduce congestion.

Work Zones by Interstate

Work zone event data from VaTraffic

	Number of Lane Impacting Work Zones		Mile - Hours of Lane Impacting Work Zones	
	2019	2020	2019	2020
I-64	141	162	8,065	16,926
I-66	13	35	112	1,338
I-81	1,163	816	35,380	21,280
Grand Total	1,317	1,013	43,556	39,544

Work event types include: new roadway construction; road widening; resurfacing; paving; bridge replacement; bridge joint, approach, deck, and superstructure repairs; bridge inspections; pavement marking installation; ITS equipment repair and installation; tunnel cleaning; and overhead sign structure repairs. Long-term work zones (>7 days) were not included.



Weather

VDOT measures the number and types of weather events and the impact on non-recurring congestion. The data helps identify emerging maintenance trends.

Short Term Weather Events

Number of weather events/incidents

Type	2019	2020
Fog	230	317
High Wind	15	85
Icy Conditions	1	

Long Term Weather Events (Road Condition)

Mile-Hours of Interstate reported in condition other than "open"

Weather Event	Road Condition	2019	2020
	Minor	38,045	9,269
Snow/Ice	Moderate	11,342	9,246
	Closed	0	



Operations Assets

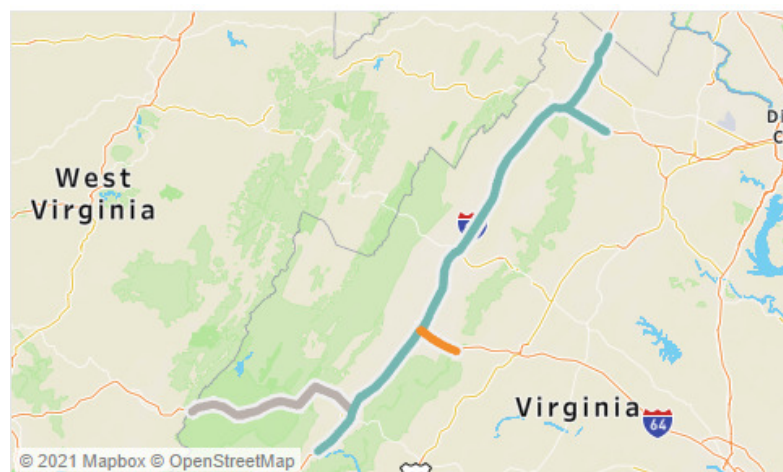
Cameras, Signs, and Safety Service Patrols are among the tools used to manage and minimize traffic congestion due to both recurring and non-recurring causes. VDOT measures the coverage areas and condition of these assets that help monitor traffic and improve mobility.

ITS Assets Availability - NWRO, 2020

Device Type	Number of Devices	% of Time Devices were Online
CCTV	124	92.8%
CCTV Portable	18	95.9%
CMS	32	87.8%
CMS Portable	38	68.5%

Safety Service Patrol Coverage

Coverage as of December 31, 2020



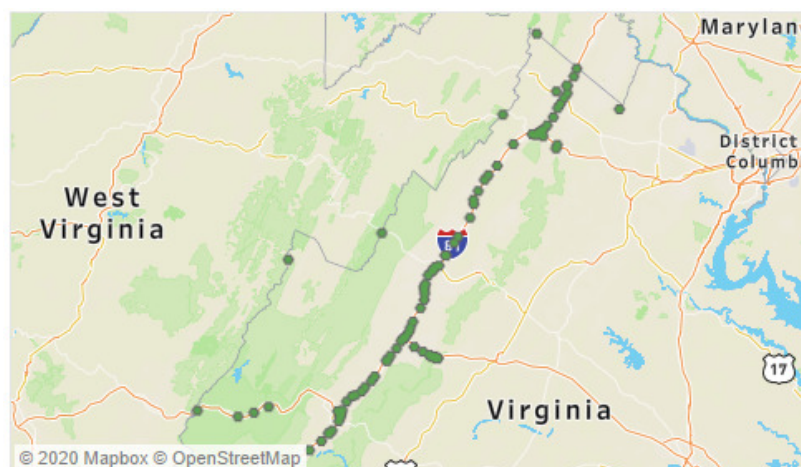
SSP Coverage Legend (Hours Per Day/Days Per Week)

12/7 16/7 No SSP

Interstate	Miles Covered	% Miles Covered	Mile-Hours Covered / Week	% Mile-Hours / Week
I-64	0	0%	1,008	9%
I-66	13	100%	1,456	67%
I-81	150	100%	16,800	67%
Grand Total	163	71%	19,264	50%

Camera Coverage

Cameras (CCTV) as of December 31, 2020

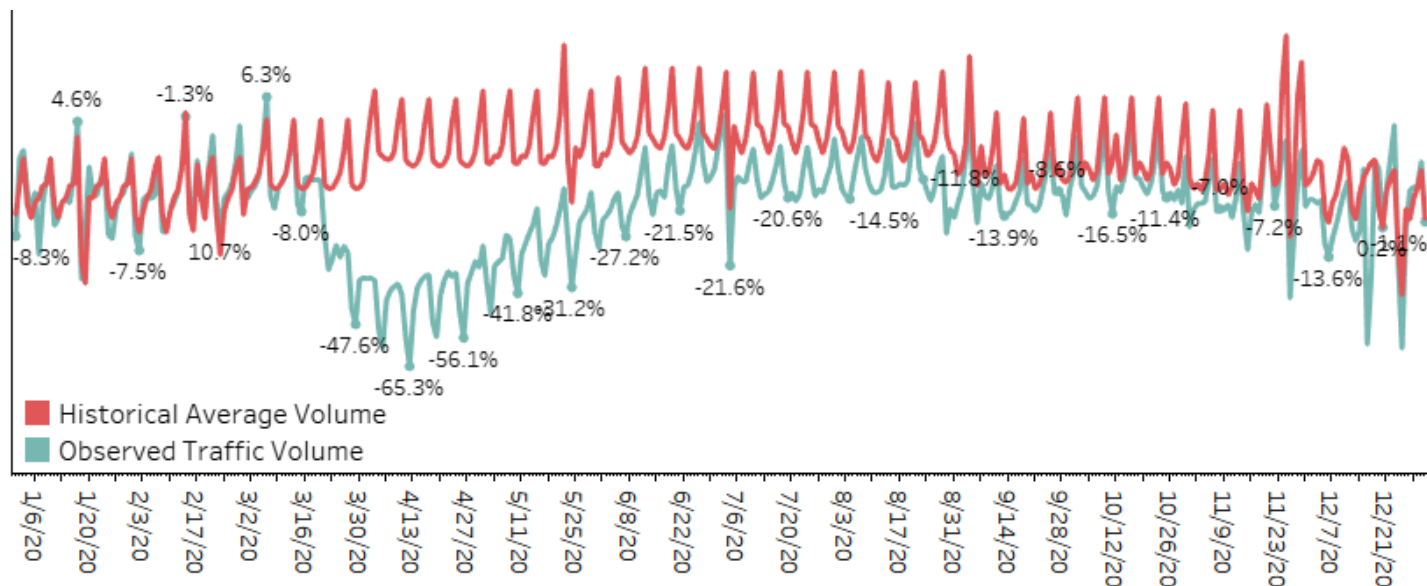


Interstate	Estimated Miles Covered by Cameras	Estimated % Miles Covered by CCTV
I-64	68	14%
I-66	13	19%
I-81	150	41%
Grand Total	231	32%

Coverage assumes that cameras can only see one side of the interstate unless it is in the median.
1 mile upstream and downstream is assumed to be covered by each camera.





COVID-19 Effects on Traffic

Changes in traffic volume in 2020

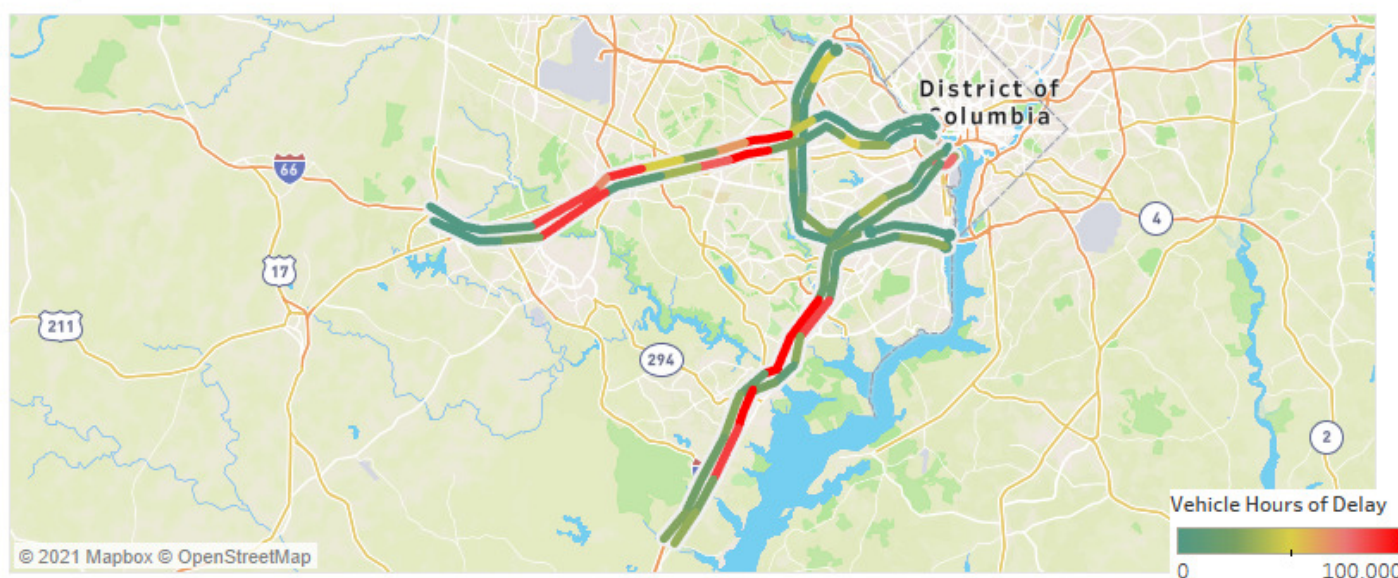


Northern Virginia District

This report compares performance of Interstate Highways from 2019 to 2020

Measure			Target	2019	2020
Total Vehicle Hours of Delay on Interstates The additional hours travelers waited in traffic that is moving 20 mph less than free-flow speed				8,291K	3,269K
ALL INCIDENTS	Roads	All Reported Incidents Number of disabled vehicle and crash incidents	N/A	31,976	24,310
		All Reported Incidents Number of disabled vehicle and crash incidents	N/A	29,661	22,377
	Interstates	Scene Clearance Time Median time from verifying the incident to opening all lanes and shoulders		33	31
		Potential Secondary Crash Incidents Estimated # of crash incidents which could be secondary to other incidents		1,297	588
LANE IMPACTING INCIDENTS	Roads	Lane Impacting Incidents # of disabled vehicle and crash incidents that block at least one travel lane	N/A	7,270	5,440
		Lane Impacting Incidents # of disabled vehicle and crash incidents that block at least one travel lane	N/A	5,638	4,281
	Interstates	Roadway Clearance Time Median time from verifying the incident to opening all travel lanes to traffic		34	41
		Lane Impacting Incidents Cleared in < 30 minutes Percentage of Lane Impacting Incidents that are cleared in less than 30 min	49%	46%	36%
		Lane Impacting Incidents Cleared in < 90 minutes Percentage of Lane Impacting Incidents that are cleared in less than 90 min	90%	91%	89%

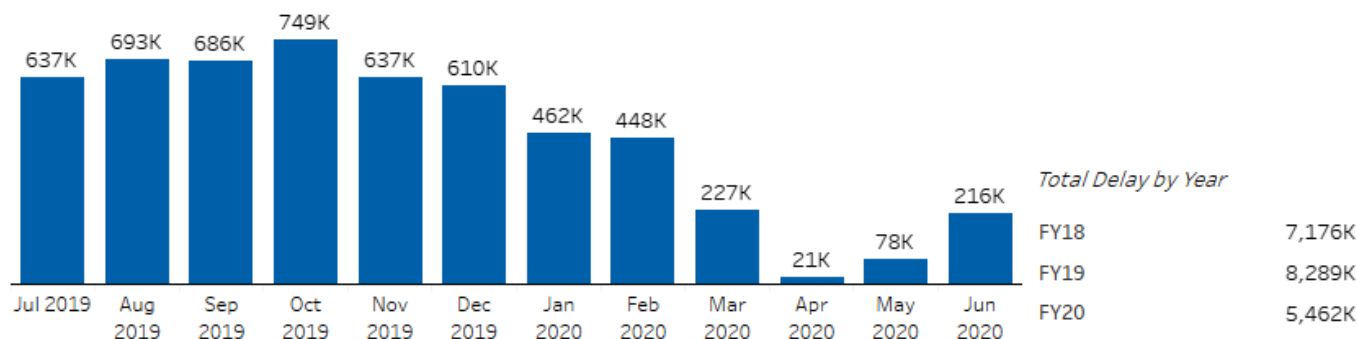
Congestion in 2020



Congestion Overview

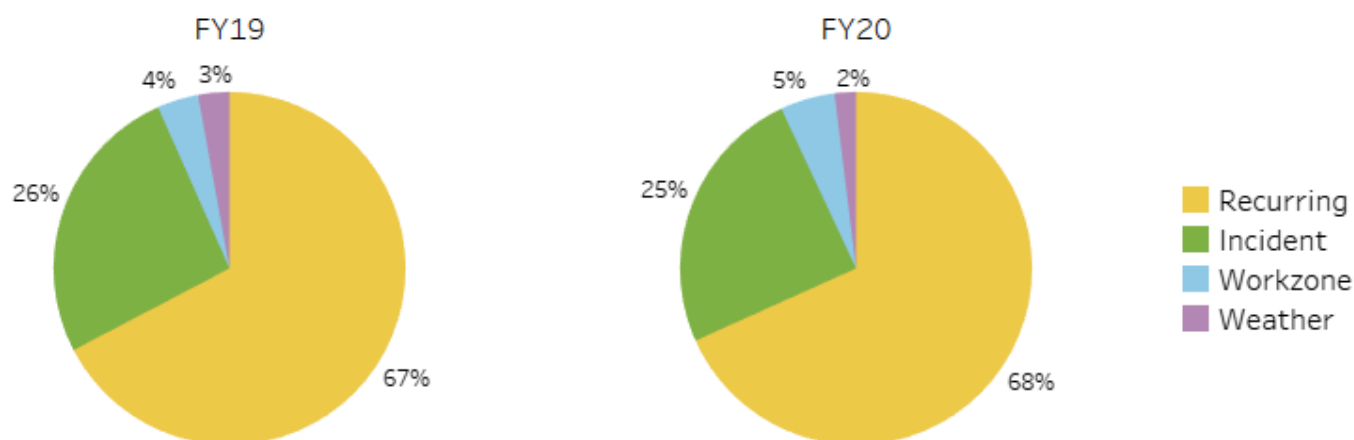
Vehicle Hours of Delay

Total Delay is calculated using INRIX probe speed data and historical VDOT volumes. Delay is calculated when the observed speed is 20 mph or more below free flow conditions.

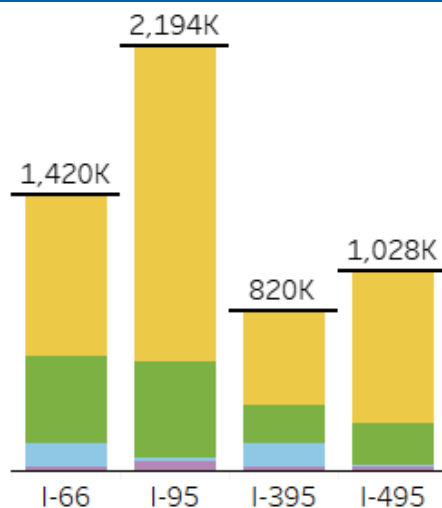


Causes of Congestion

Congestion can be broken down into recurring and non-recurring sources. Recurring congestion is caused by bottlenecks due to high volume or geometric constraints. Sources of non-recurring congestion on interstates include incidents, work zones, and weather events. The amount of congestion due to each of these sources can be estimated at a planning level as shown below.



Delay by Cause & Interstate in 2020



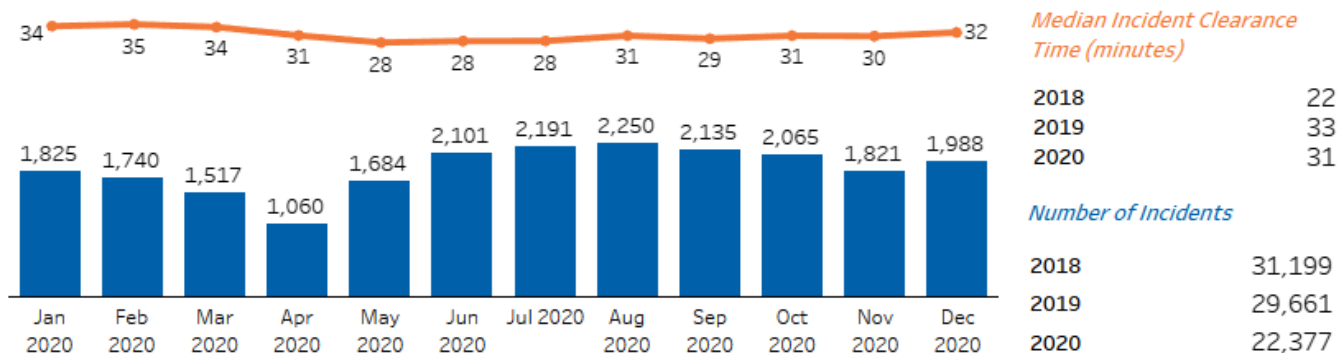


Incidents

Traffic incidents includes both crashes and disabled vehicles and are a frequent cause of non-recurring congestion. Quick clearance programs such as Safety Service Patrols, incident management coordination, and after-action review with the Virginia State Police (VSP) and the other first responders can influence the effects of incidents on traffic.

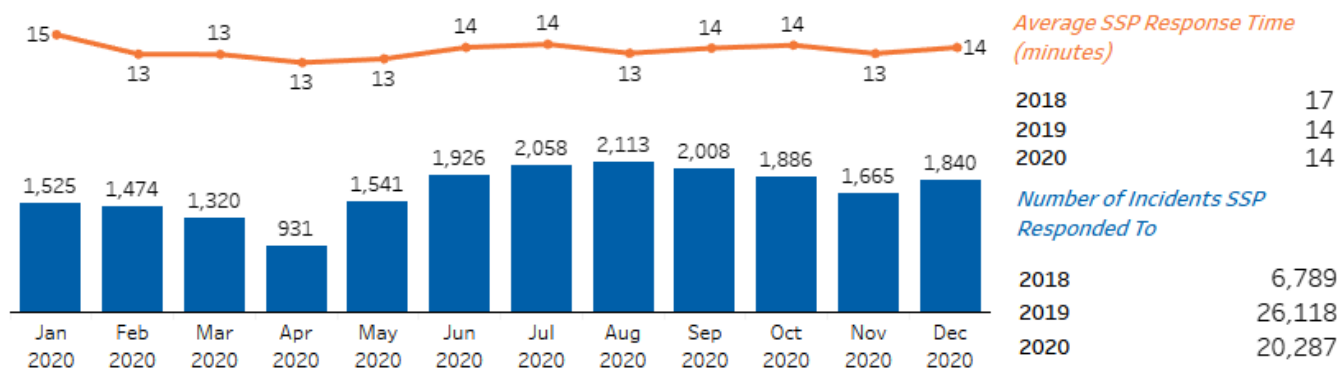
Total Incidents & Incident Clearance Time

Incident Clearance Time (also called Scene Clearance Time) is measures for all crash and disabled vehicle incidents on travel lanes and shoulders. Median Incident Clearance Time is shorter than Median Roadway Clearance Time because it is measures for all incidents, not just those which are lane impacting. A simple incident on a shoulder, such as a vehicle with a flat tire, is often quick to clear.

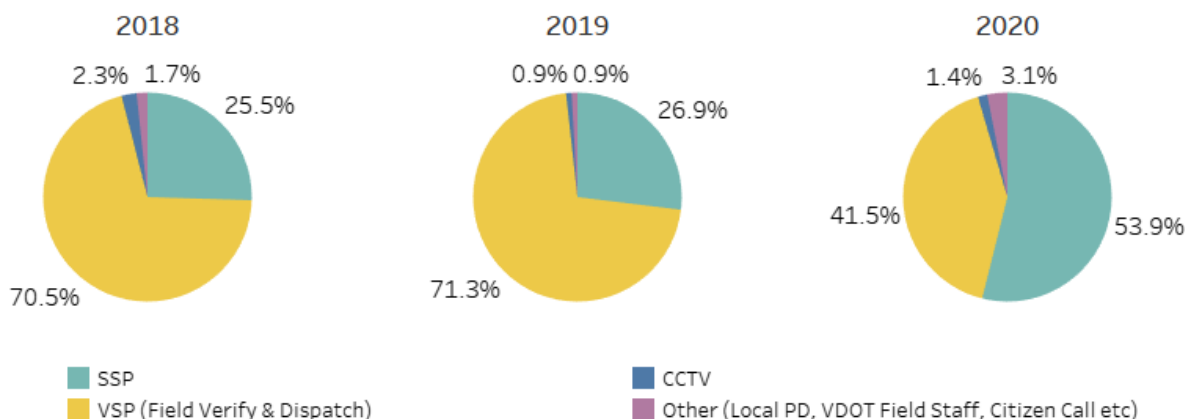


Safety Service Patrol Incident Responses & Response Time

Safety Service Patrol (SSP) Response Time is measured in minutes from the time the SSP Operator was notified to the time they arrived on Scene. This is measured for all disabled vehicle and crash incidents, which an SSP responded to. (Average Response Time between 2 and 60 minutes is measured)

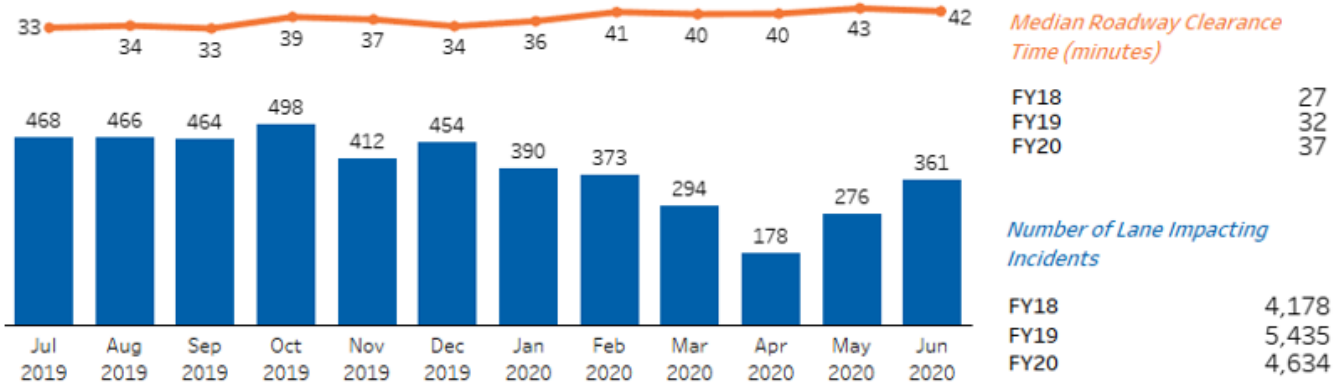


All Incidents by Detection Source



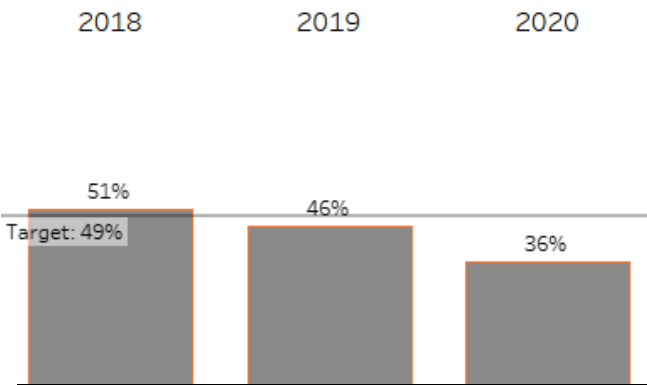
Lane Impacting Incidents & Roadway Clearance Time

Roadway Clearance Time (RCT) is measured for all disabled vehicle and crash incidents that block at least one travel lane during the course of the incident. RCT is measured from the start of the incident to when all travel lanes are clear and open to traffic.

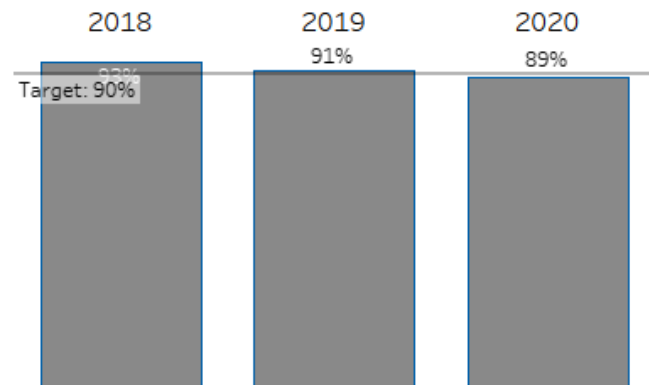


Lane Impacting Incidents by Roadway Clearance Time

Lane Impacting Incidents Cleared in <30 minutes

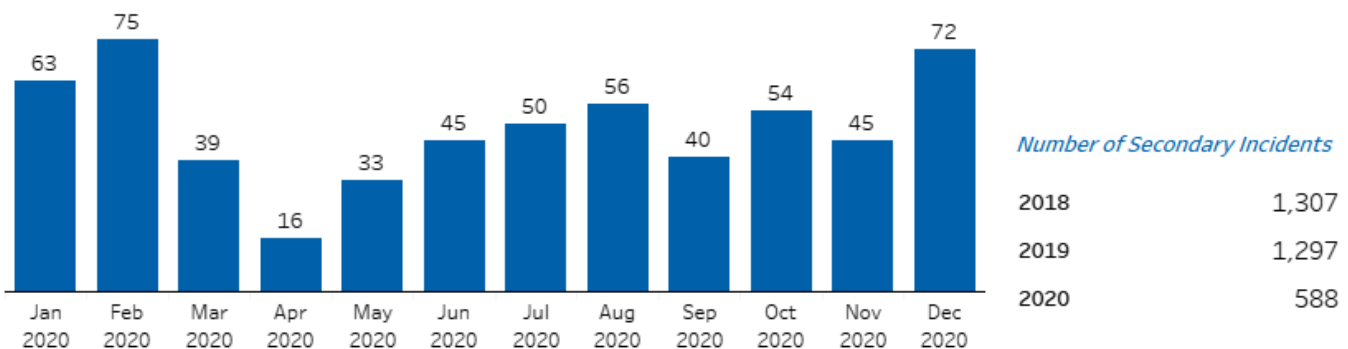


Lane Impacting Incidents Cleared in <90 minutes



Potential Secondary Incidents

The estimated number of crash incidents which could be secondary to other crash or disable vehicle incidents.





Work Zones

VDOT measures the number and types of work events and the impact on non-recurring congestion. The allowable work hours are regularly reviewed to promote safety and reduce congestion.

Work Zones by Interstate

Work zone event data from VaTraffic

	Number of Lane Impacting Work Zones		Mile - Hours of Lane Impacting Work Zones	
	2019	2020	2019	2020
I-66	2,853	4,134	41,611	59,726
I-95	276	321	3,800	5,847
I-395	2,054	593	36,756	10,013
I-4965	426	473	3,690	4,516
Grand Total	5,609	5,521	85,856	80,102

Work event types include: new roadway construction; road widening; resurfacing; paving; bridge replacement; bridge joint, approach, deck, and superstructure repairs; bridge inspections; pavement marking installation; ITS equipment repair and installation; tunnel cleaning; and overhead sign structure repairs. Long-term work zones (>7 days) were not included.



Weather

VDOT measures the number and types of weather events and the impact on non-recurring congestion. The data helps identify emerging maintenance trends.

Short Term Weather Events

Number of weather events/incidents

Type	2019	2020
Icy Conditions	11	7
Standing Water (Ponding)	27	31
Other	20	16

Long Term Weather Events (Road Condition)

Mile-Hours of Interstate reported in condition other than "open"

Weather Event	Road Condition	2019	2020
	Minor	3,968	29
Snow/Ice	Moderate	360	197
	Closed		0



Operations Assets

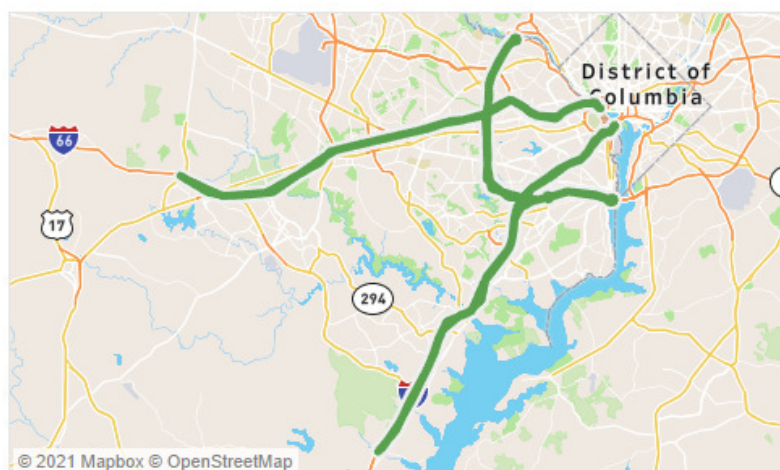
Cameras, Signs, and Safety Service Patrols are among the tools used to manage and minimize traffic congestion due to both recurring and non-recurring causes. VDOT measures the coverage areas and condition of these assets that help monitor traffic and improve mobility.

ITS Assets Availability - NRO, 2020

Device Type	Number of Devices	% of Time Devices were Online
CCTV	280	97.7%
CCTV Portable	21	98.8%
CMS	121	94.8%
CMS Portable	15	99.8%

Safety Service Patrol Coverage

Coverage as of December 31, 2020



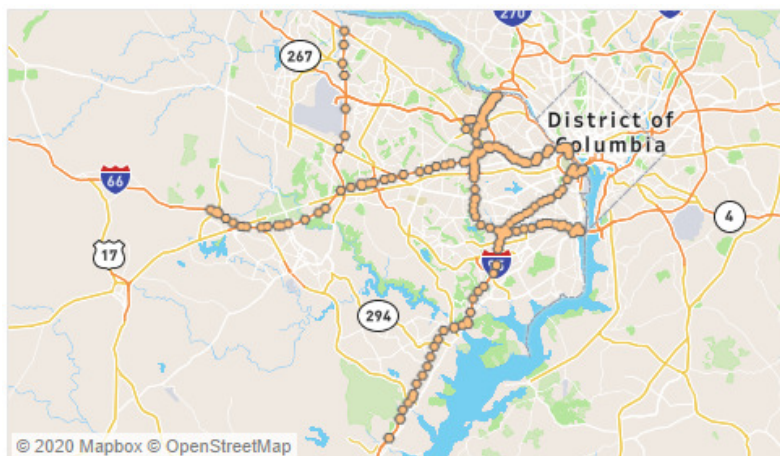
SSP Coverage Legend (Hours Per Day/Days Per Week)

■ 24/7

Interstate	Miles Covered	% Miles Covered	Mile-Hours Covered / Week	% Mile-Hours / Week
I-66	35	100%	5,880	100%
I-95	30	100%	5,040	100%
I-395	10	100%	1,680	100%
I-495	22	100%	3,696	100%
Grand Total	97	100%	16,296	100%

Camera Coverage

Cameras (CCTV) as of December 31, 2020



Interstate	Estimated Miles Covered by Cameras	Estimated % Miles Covered by CCTV
I-66	35	81%
I-95	30	78%
I-395	10	76%
I-495	16	95%
Grand Total	91	82%

Coverage assumes that cameras can only see one side of the interstate unless it is in the median.

1 mile upstream and downstream is assumed to be covered by each camera.

COVID-19 Effects on Traffic

Changes in traffic volume in 2020

